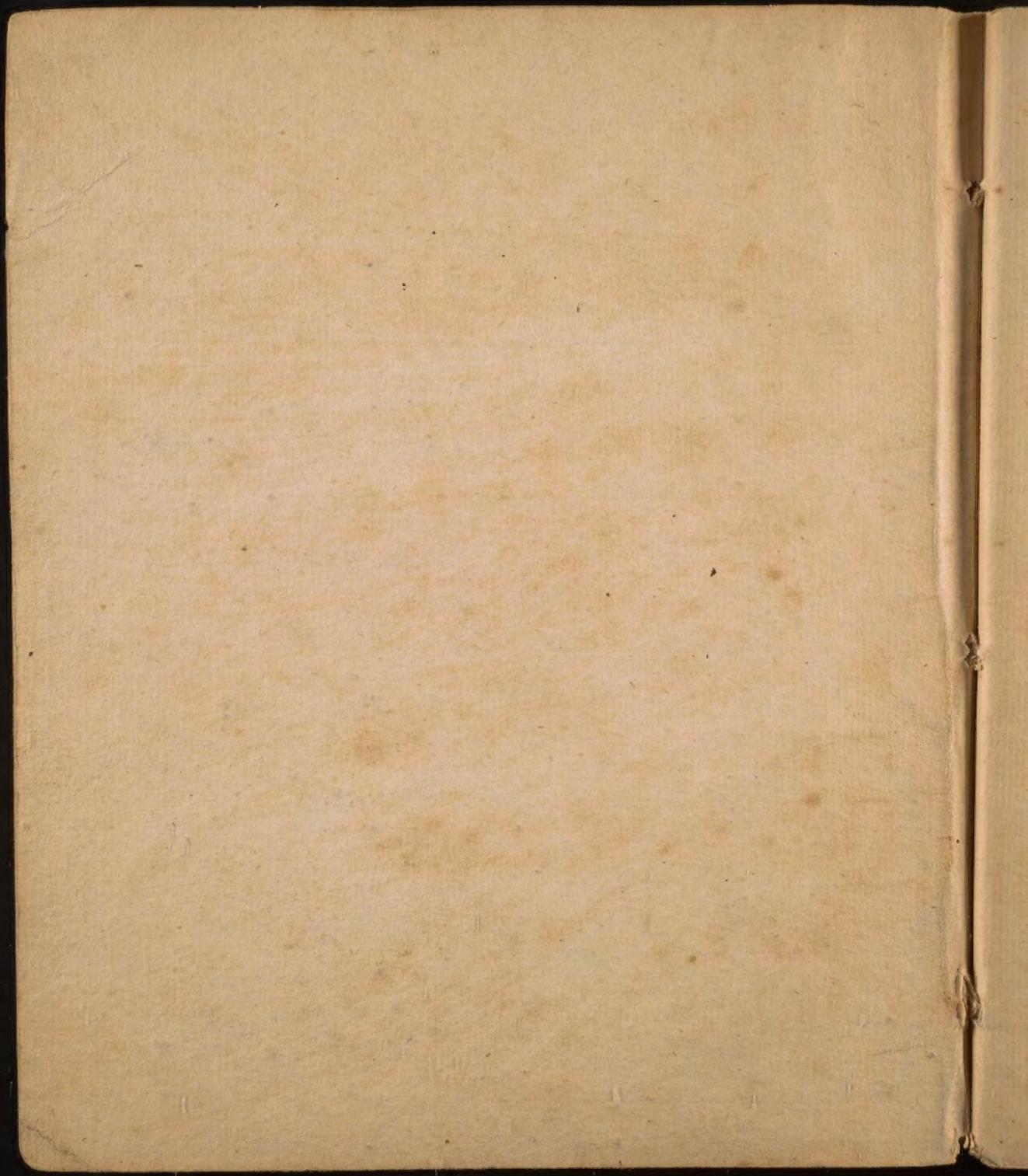


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of Digestion 621.
By the Cycle -
of the blood - 652.

v I shall first remark that the Stomach is a most important viscus, hence it is possessed by all animals. It is so full of nerves that it may be considered the sensor by ~~data genera~~ excepted. So essential are its functions to life, that it has said the soul is seated in it. It is certainly the index of the state of the system in many Diseases. It ~~is~~ ^{proves} a ^{Association in Health by sympathy in sickness} wonderful ~~connection~~ with every part of the body; in health as well as sickness - The nerves and blood vessels may even the mind are affected by it. - hence it should never be lost sight of in inquiring into investigating, & prescribing for diseases of those parts. Many diseases it is said enter the body thro' the medium of the

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such parts of the mouth as to favour
the action of the teeth upon it. It after-
wards protrudes into the fauces from
where it passes by the tonsils - Vomer
palatinus & Epiglottis assisted by the action
of a great number of small muscles
into the Oesophagus - and from thence
into the Stomach where it undergoes
the process of digestion. ^{Solids} This more easily
swallowed than fluid.

of Digestion.

QUESTION In what manner is this
performed? - The answer to this
question shall be the business of
^{our} ~~present lecture~~ ^{inquiry.} — V

THE changes which the food
undergoes in the Stomach principally

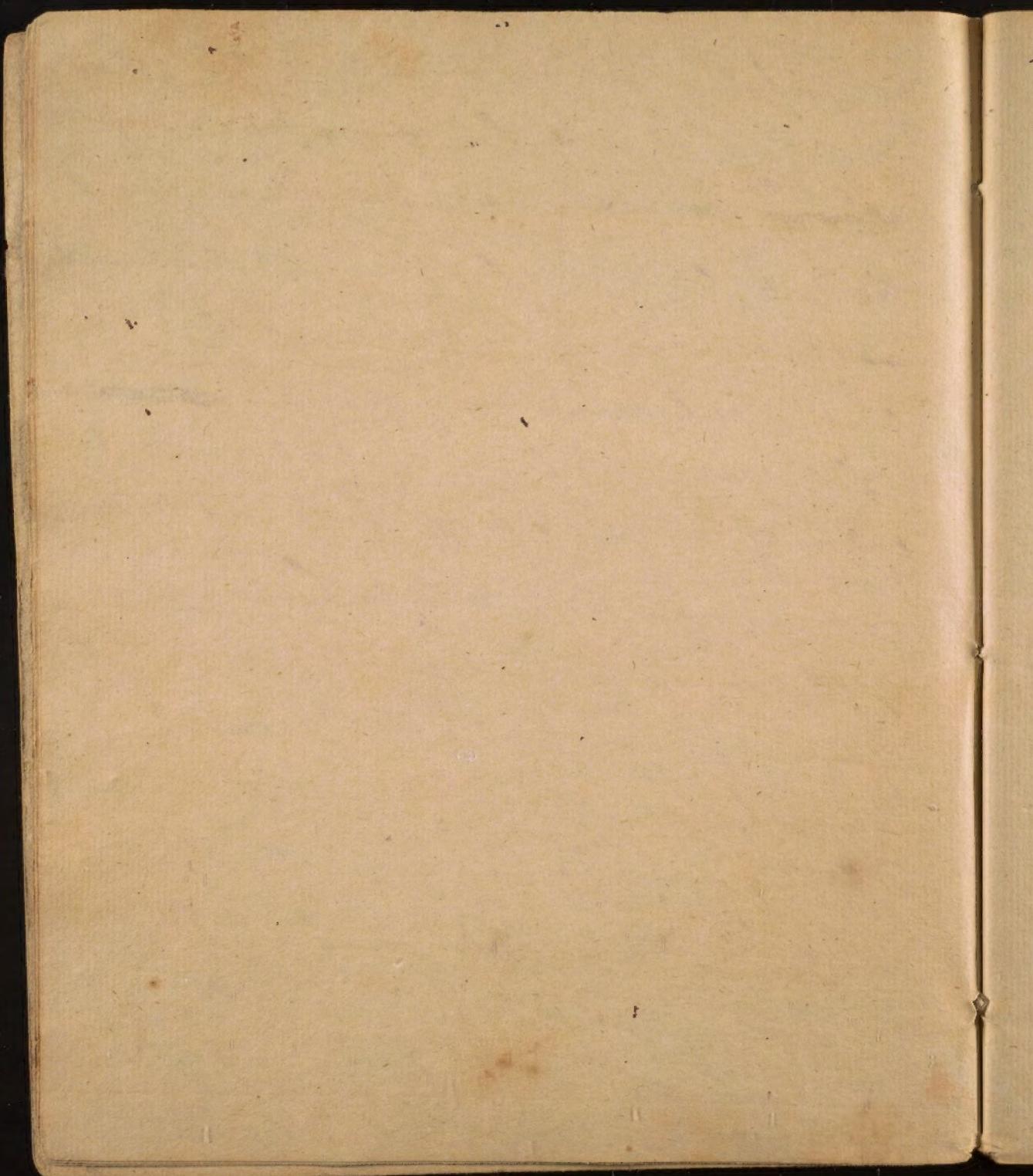
Stomach - still more I believe are
expelled from the body which act
primarily, & exclusively upon it. -
~~But to return~~ -

It is formed ~~as~~ like the teeth upon the
compound principles of carnivorous
& granivorous animals.

Its function is an important one
in the animal Economy. ~~The we behold~~
is something like what the Alchemists
have sought for in their crucibles - in
their attempts to obtain Gold from the
base metals - a power of changing the
most dissimilar heterogeneous matter
into a ~~water~~ substance which imparts
nourishment & life to the human
body. -

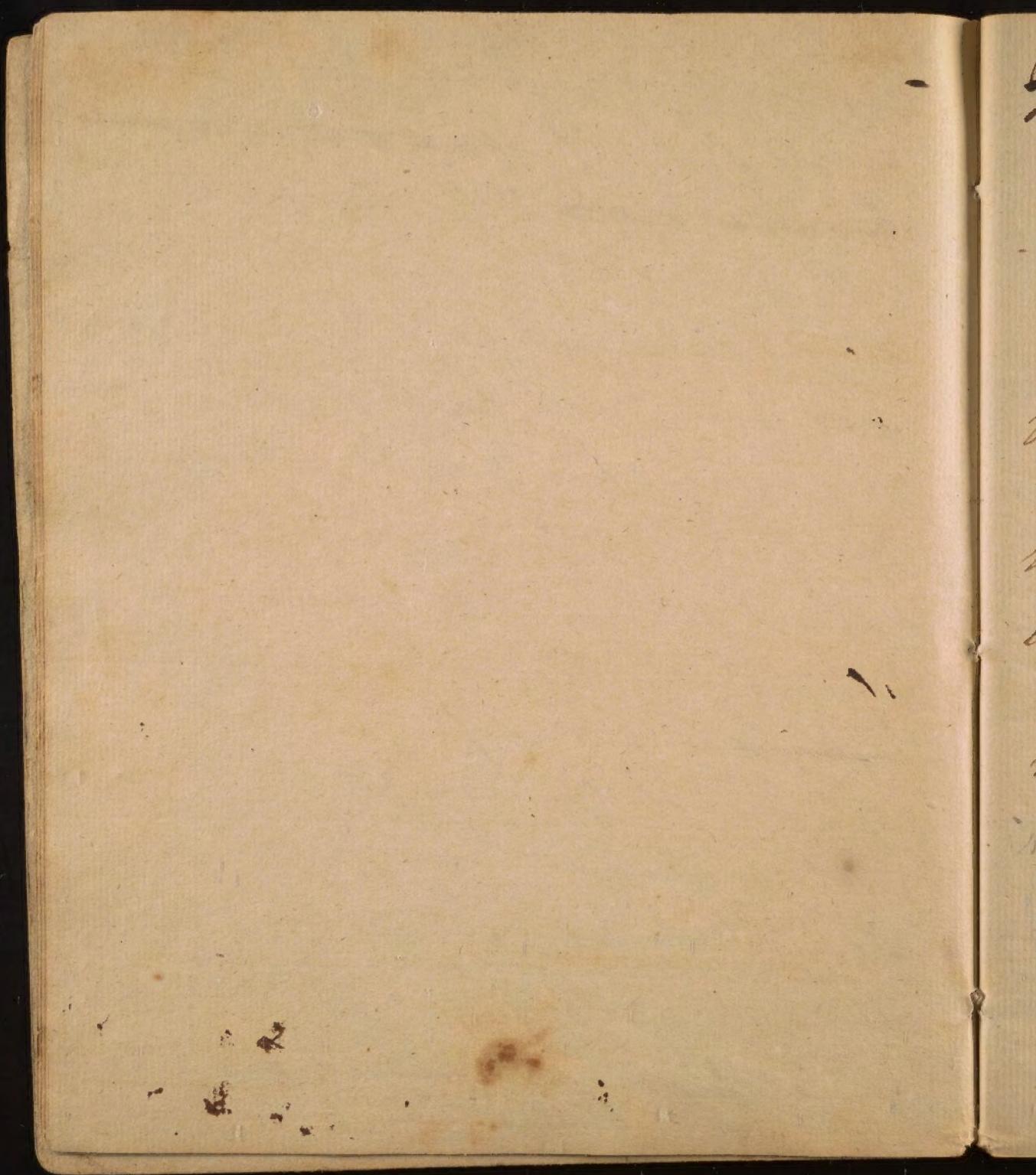
to its being converted into chyle, has been divided to the operation of two agents. These are 1 mechanical and 2 chemical. The mechanical ~~includes~~ includes Nitration only. The chemical includes ^{Putrefaction -} ~~heat - putrefaction -~~ Solution - and fermentation. of each of which I shall treat in Order.

Much was ascribed to Nitration by the mechanical physicians. Pitcairn has computed the force of the employed in digestion stomach, to be equal to 12,951 pounds. Dr Boishuane has enumerated all the forces which are ~~supposed~~ to act, in digestion - There are the muscular action of the stomach - the action of the Diaphragm in respiration - and



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even the constant pulsation of the Aorta
on the Stomach. ~~but nothing can~~
~~be said for~~ Dr Pitcairn's calculation
of the force of the Stomach does not
deserve to be contradicted, and the forces
~~of~~ enumerated, ~~by~~ Dr Burhaamne,~~is~~
will appear to be very trifling from
the history of the following exp^t: made
by Ssakasrami. He swallowed 25
whole grapes - and discharged 18 of them
^{in an} ~~without~~ unbroken state. He swallowed
many whole cherries afterwards, most
of which he discharged in the same
sound state in which he took them.
The triturating force of the stomach
must be small indeed ~~not to~~



~~have~~⁶²⁴ destroyed the texture of those tender fruits. We ground next to ingesta into the chemical Agents which have been supposed to be employed in digestion.

~~I reject~~ I reject putrefaction altogether from having any agency in digestion. On the contrary the putrefaction of the Aliment unfits it so much for being converted into Chyle - that when Aliment which partakes of a putrid Nature is received into the Stomach it always exerts by the action of the Gastric juice upon it. —

The ~~other~~^{other} agents which are concerned in Digestion, I suppose to be, Heat & Solution. ^{& another to be mastication} ~~the power of the teeth~~ & hereafter.

E. C. & D. A.

Dr Spallanzani has determined this by an accurate exp^t: - he exposed a hen's heart with some flesh to a heat = to $\frac{1}{2}$ of $\frac{1}{2}$ human body - & the same quantity to a heat of the common air which was probably 20° degrees below it. The first putrefied in 12 hours - the last - in 2 or 3 days.)

Mr Hunter found that the digestion of a frog which went on at 65 60° was effectually checked ~~at~~ when it fell to 35° or 40°. It is from the influence of heat ^{in part} that digestion goes forward more rapidly in warm blooded, than cold ^{go} animals. E.g. Dog - viper

Heat is essential to digestion. The polypus employs 2 or 3 days in Winter in digesting that food which it digests in 12 hours in summer. ~~without heat~~ ^{no solution} ~~solution~~ can take place ^{the} without it. The gastric juice which is the principal solvent of the element in the stomach ~~discovered~~ ^{no more} has no more digesting power ~~in~~ in a heat of 44° or even 48° than common water. It is more active in a heat of 79° but its digesting power is greatest at 112° . ✓

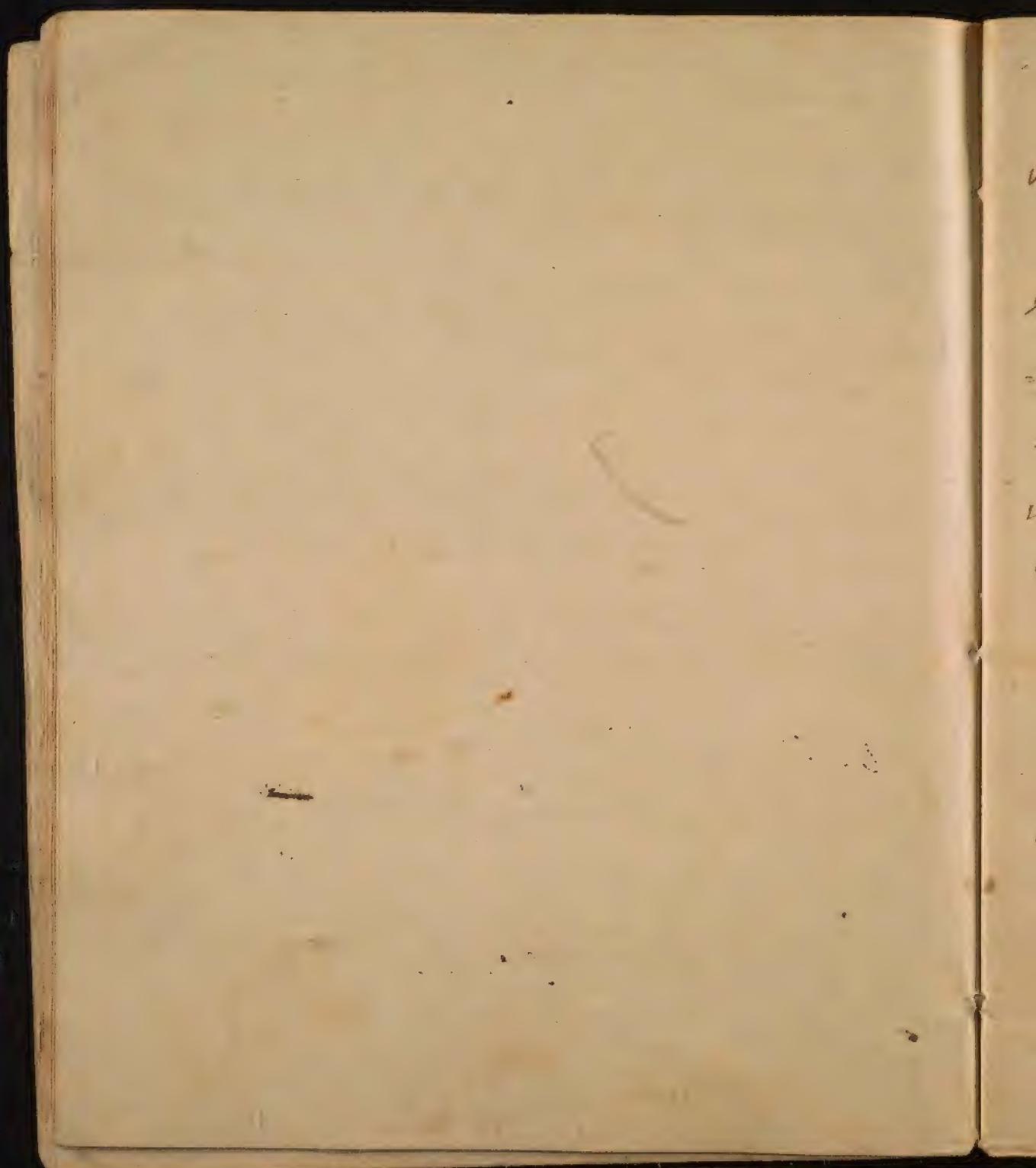
~~Heat is likewise essential to fermentation, and no degree is more favorable to an active and perfect fermentation than the heat of the human body.~~

v The dissolving power of the saliva has
been established by ~~many~~^{many} experiments. ¹²³ ~~774~~
~~all~~ of it are secreted in the course of
24 hours. It serves the ^{purpose} further it is
supposed of absorbing ~~Oxygen~~ which
it conveys into the body. It has
neither taste, nor smell, and hence
~~it~~ it never impairs in its healthy
state either ~~one~~ of the powers of taste or
smell.

Solution is likewise essential to digestion. The liquors which dissolve the food, are, the Saliva, & the Gastric juice.

~~To decide the dispute between Dr. D. & Dr. P. & Sir H. Parry, Jim one of whom expects that it promotes the other effects of the Gastric juice is the most active of these liquors. It was not the honor of Spallanzani to have discovered that the Gastric juice possessed a strong dissolving power over animal & vegetable substances by his experiments.~~

The same doctrine was established by Dr. Haller ^{many} years ~~ago~~ before the time of Spallanzani. This gastric juice acts more or less in all animals, but more in some of



them than others. — Those Animals
 which have grinders stand in the least
 need of it — for they divide the food in
 such a powerful manner that it after-
 wards requires but little solution in
 the Stomach. Its dissolving power is
 very great in the human stomach, — here
 we find cartilages — tendons & even
 bones are dissolved by it as well as
 common flesh. — It is probably more
 abundant and more active in children
 & in old people than in ~~the~~ middle
 age, in order to supply the defect of
 mastication from the want of teeth.
 It acts most speedily upon all
 food that is well masticated, and upon flesh

"V The presence of nervous influence
is indispensably necessary to digestion.

By cutting, or tying the 8th pair of
nerves, digestion was destroyed in
a wolf & a dog, insomuch that
the contents of the stomach Dr.
Waller says become putrid soon
afterwards.

which is perfectly done or well cooked.
This has fully demonstrated by the exp:
of D'Estivens & St Coix in his thesis
on digestion. —

This gastric juice has been said by
Inostander to dissolve the stomach after
death. It is possible this is sometimes the case
— but I am disposed to consider
what he calls a corrosion of the stomach
by this liquid to a destruction of
substances from inflammation & mortification.
Such appearances are very common
after death in all the bowels, where
we are sure the gastric juice exert
no ~~digestive~~ corroding power.

Spadanzani says he found diges-
tion go forward after death, but ⁱⁿ
a very feeble degree after the heat

& notice of this aid.

In addition to these powers, in promoting digestion, the influence of the ~~whole~~ ^{system of} ~~whole~~ system is necessary for this purpose - hence we find it impairs, ^{not only} deprives ^{but} ~~the~~ ^{of} passions of the mind, ~~as~~ by all those accidents, and diseases, which divert ~~the nervous influence from it to the short~~ ~~and supply the body with food~~ It is exclusively an animal power as much so as the formation of blood & semen, & never less & perhaps never can be initiated ~~out~~ of the body.

go to p: 644 +

+ I beg this fact to be remembered. Austerities & low diet, founded on it. When we wish for the aid of all the powers of life, in curing a disease, let us ^{curse} give them nothing to do in digesting a quantity of food, or food difficult to digestion. ^{and} ~~not~~ manners.

of the dead animal was dissipated.

The gastric juice yields by a chemical analysis a large proportion of the animal ammonical salt - in which is contained the phosphoric or animal acid. Take

~~the stomach~~ ~~it~~ proposed a power of curdling milk, ~~but~~ ~~this is evident by~~ ~~but does not go to the stomachs~~

of many young animals, particularly ~~children~~, calves, turkeys & fowls. But

This power resides in ~~the~~ ^{the} animal

substances in the ~~liver~~ ^{liver} - ~~and~~ ^{also} ~~in~~ ⁱⁿ the heart of a turkey. It ~~resides~~ ⁱⁿ ~~in~~ ⁱⁿ fish ~~as~~ ^{as} may ~~ever~~ ^{ever} it ~~can~~ ^{can} be ~~the~~ ^{the} liver of

~~the~~ ^{the} ~~liver~~ ^{liver} ~~of~~ ^{of} ~~I must give facts~~

~~only to deprive myself~~

~~the first aid of 10 cups,~~

~~first to rapid in the~~

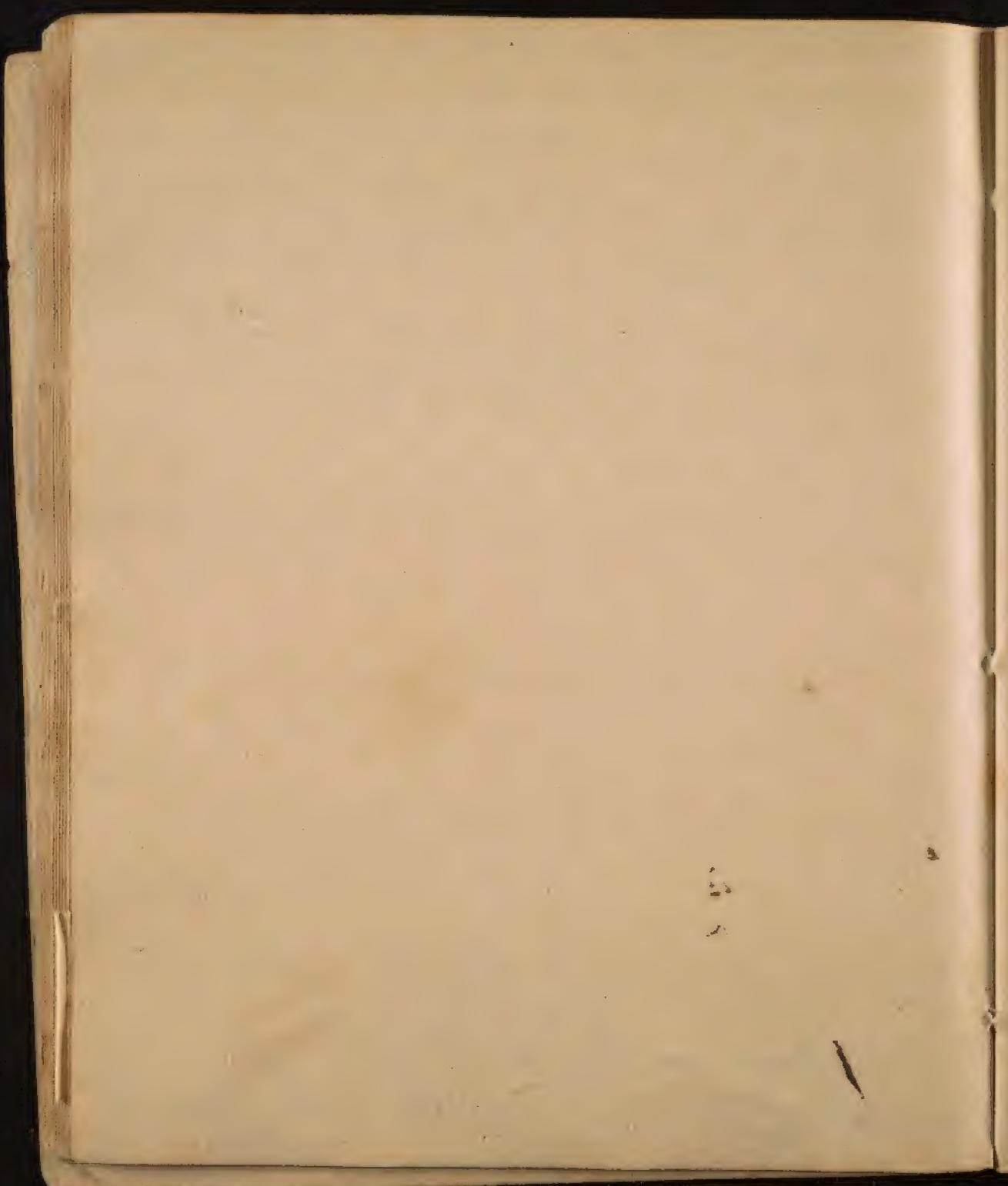
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juice, or that fermentation was
in a degree promoted by it. —

The Aliment being thus prepared by
solution, undergoes a third change in
the Stomach by means of Fermentation.
I know this process to be Digestion to be
rejected from the modern systems of Phy-
siology — I know too that there is as
much a fashion in opinions as there
is in drfs. I shall however still defend
fermentation as one of the causes
of digestion not because I have like
Gil Blas written a book upon it, but
because I cannot account for all
the phenomena of digestion without
it. Such of you gent: who know



how many opinions whence which
 I once believed and taught - I have rejec-
 ted in the course of the last ^{10 or 15} ~~25~~ years
 will not ause me of obstinacy upon
 this subject. — my weakness in the
 republis of medicine is of a very ob-
 opposite nature. — It consists in a dispo-
 sition to change ~~sense of~~
~~desire to change~~ ^{to be willing} ~~for~~ ^r my opinions. If this
 be a disorder in my mind, I ~~do~~ hope
 no remedy will ever be discovered to
 remove it - for ~~so~~ I conceive that for
 ever to unlearn, ~~instead of learning~~
~~is~~ ^{the only way to come to a} ~~most certain & effectual~~
 knowledge of the truth]. —

[By fermentation I mean that
 natural process by which ~~assay~~ heterogeneous

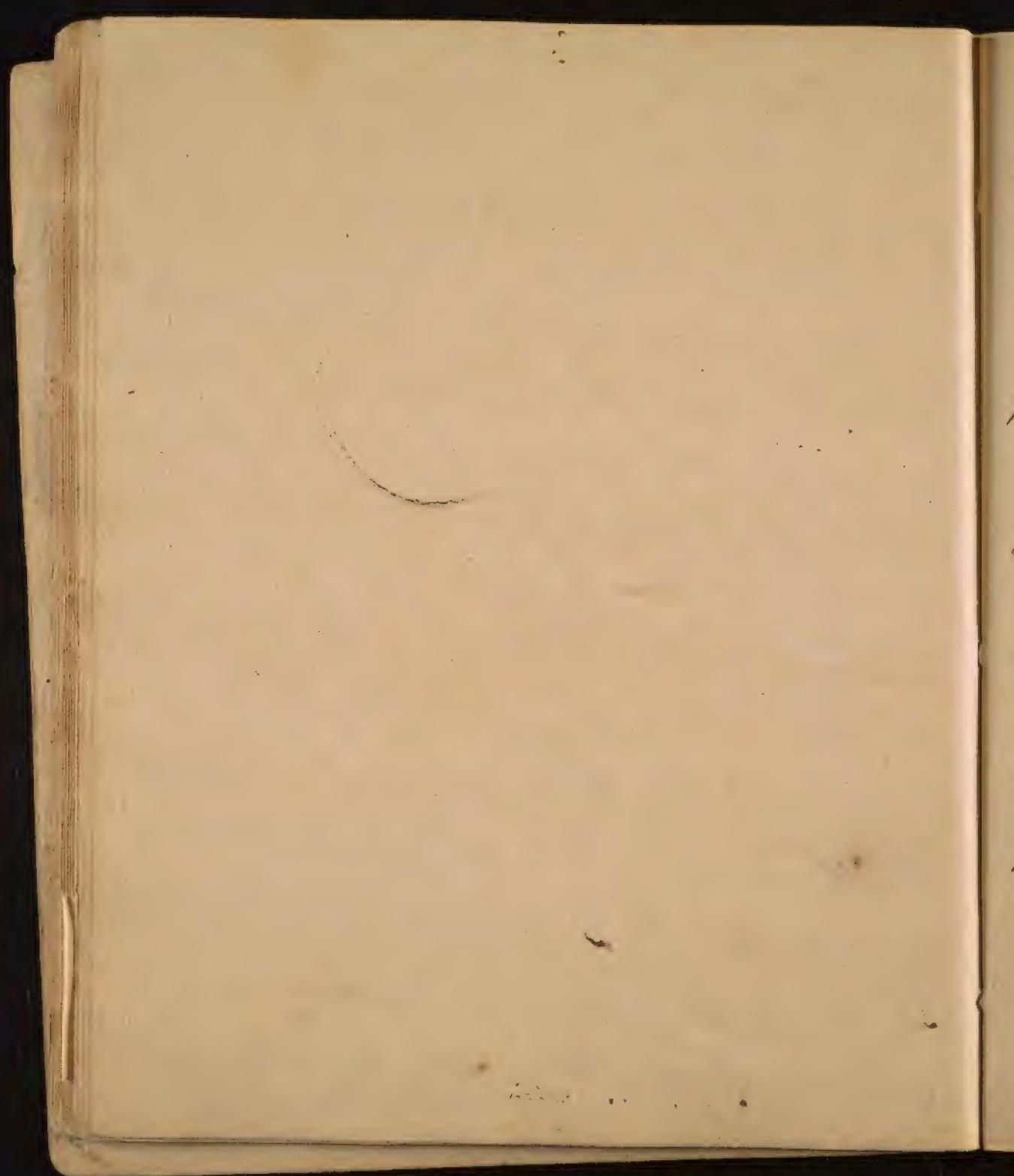
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matter is rendered homogeneous, so that a new product is obtained, wholly different from the original mass from which it was formed. —

Animal & vegetable - & even fossil substances are all capable of fermentation. — It is specifically different in each of those classes of matter. ^{when} For vegetable matters, undergo the process of fermentation, they ~~pass~~ ^{of} ~~through~~ ^{the} three stages - viz the vinous ~~an~~ the acetic & ^a putrefactive state. It is uncertain whether animal matters pass thro' the vinous, — tho' some facts make it probable, — but it is certain that they undergo the acetic ~~lactic~~ and putrefactive states. Dr Haller informs us



that he had distinctly perceived an acid smell
in meat, and Dr Thomas Smith informed
me that he distinctly perceived ^{of Birmingham}
an acid smell but an acid ~~taste~~ ^{taste} in a piece
of beef which he had kept two days in
summer. —

Your ~~words~~ circumstances are necessary to
favour the fermentation I have described.

1 Heat from 72° to 112° are most favora-
ble to it.

2 moisture: Sugar tho' it affords the
basis of fermentation in all vegetables,
yet may be kept in a sound state for
an ~~two~~ years provided it be kept free from
moisture. — 3 Air.

4 Rest: This is necessary to render all
the stages of fermentation regular.
Motion ^{whether impeded} ~~so~~ either prevents it altogether

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or burns it over suddenly to the acetous
or putrefactive stages. —

The fermentation of all ~~matter~~
capable of it is quickened by certain ^{substances}
matter called ferments.

Let us now inquire how far these
principles apply to the digestion of our
food.

1 Our Aliment consists of such sub-
stances as undergo the various - acetous
& putrefactive stages of fermentation
out of the body. —

2 The heat of the Stomach is highly
favourable to the fermentation of
the Aliment when received into the
Stomach. (3) our Aliment & Saliva are
both strongly injurious to the Air.

3 The Aliment derives from Saliva -

and digestion is favoured by it.

v Dr Hamwood of Cambridge proved the
Advantages of rest after eating by the
following experiment. He gave two
pigeons a hearty meal of flesh.
One rested - the other ran two hours
after eating. In the former all the
food was digested - in the other - it
was scarcely begun.

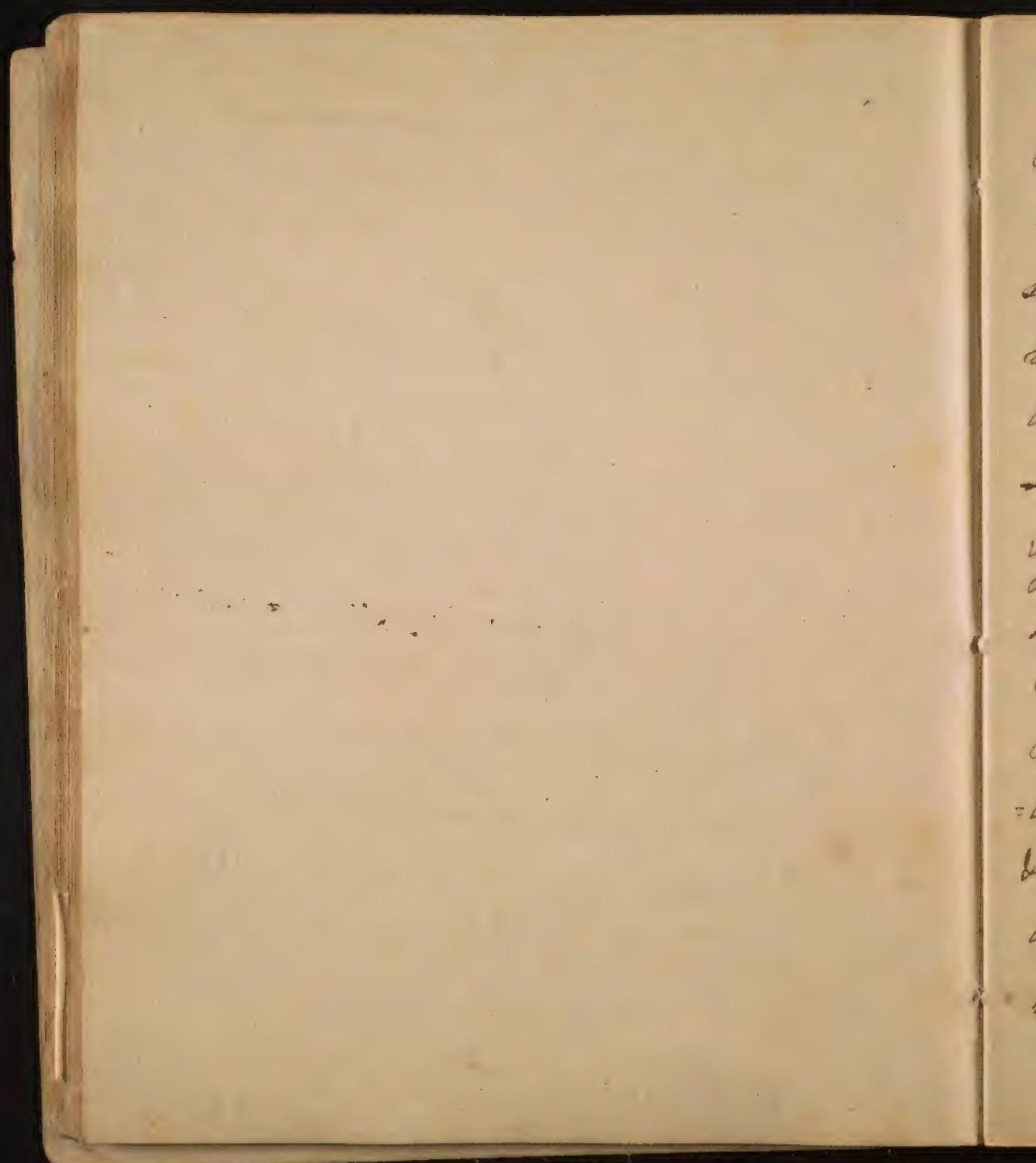
The state of the
air influences digestion. The inha-
- bitors of the savannas of Africa
= land digest the greatest aliment
upon their movements which
are so varied and gross that they can-
not digest them upon this plain.
return gasat p 648 ✓

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-gastric juice - and the liquids mix the
with our meals, ~~sufficiently~~ that
degree of moisture which is ample suffi-
-cient to promote its fermentation.

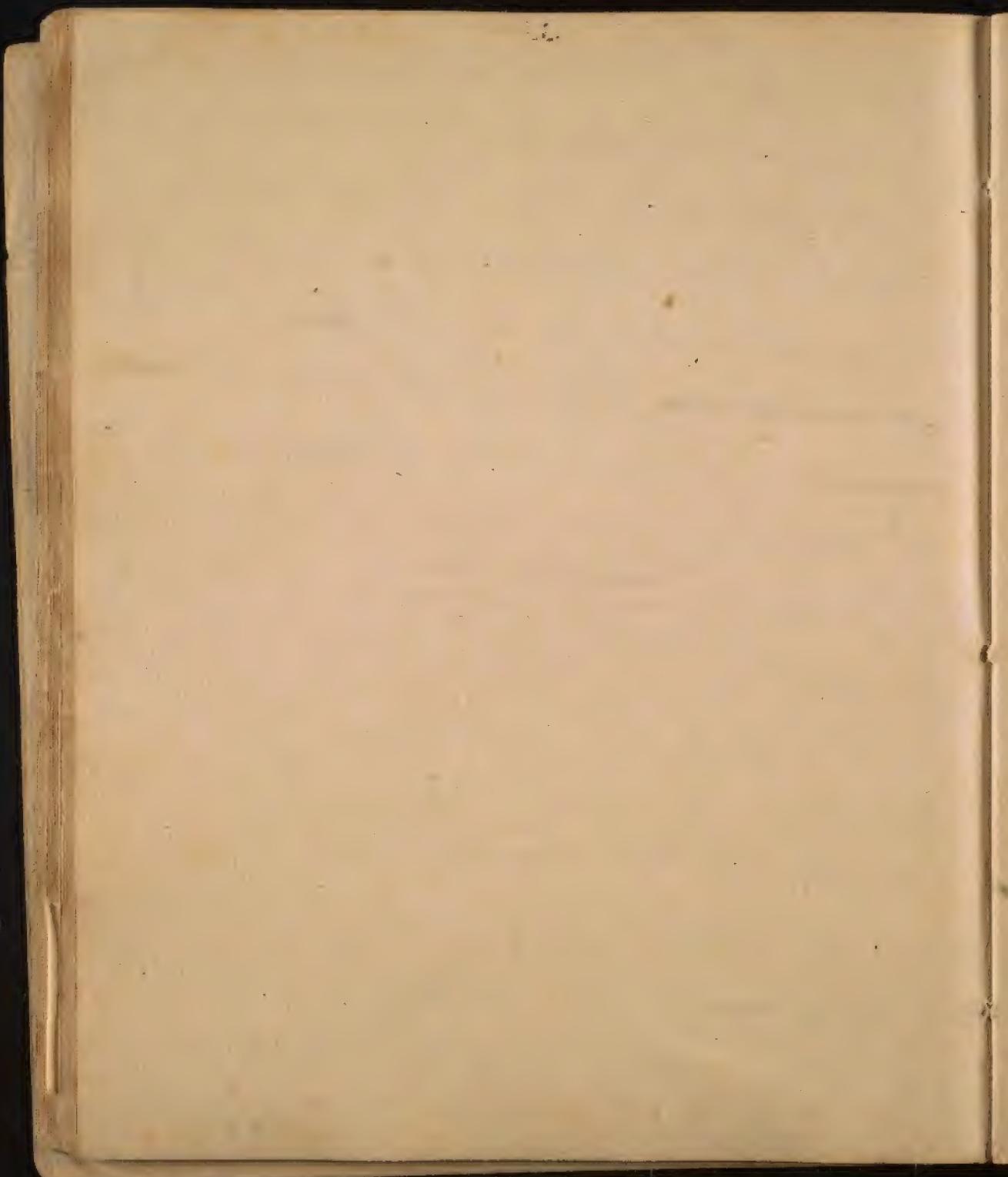
5 Digestion is always best promoted by moderate motion when greater than the ^{expansive} action of walking best. Motion impairs it if overdone after eating a heavy meal. → V

But it may be said that the celerity
with which digestion is conducted in
the Stomach is too great for the slow
processes of fermentation - tho' favoured by
all the circumstances which have been
mentioned. I should say even in this
objection does not arise two things
which are calculated to accelerate
it beyond its ordinary term of duration
out of the body. These are 1st Its

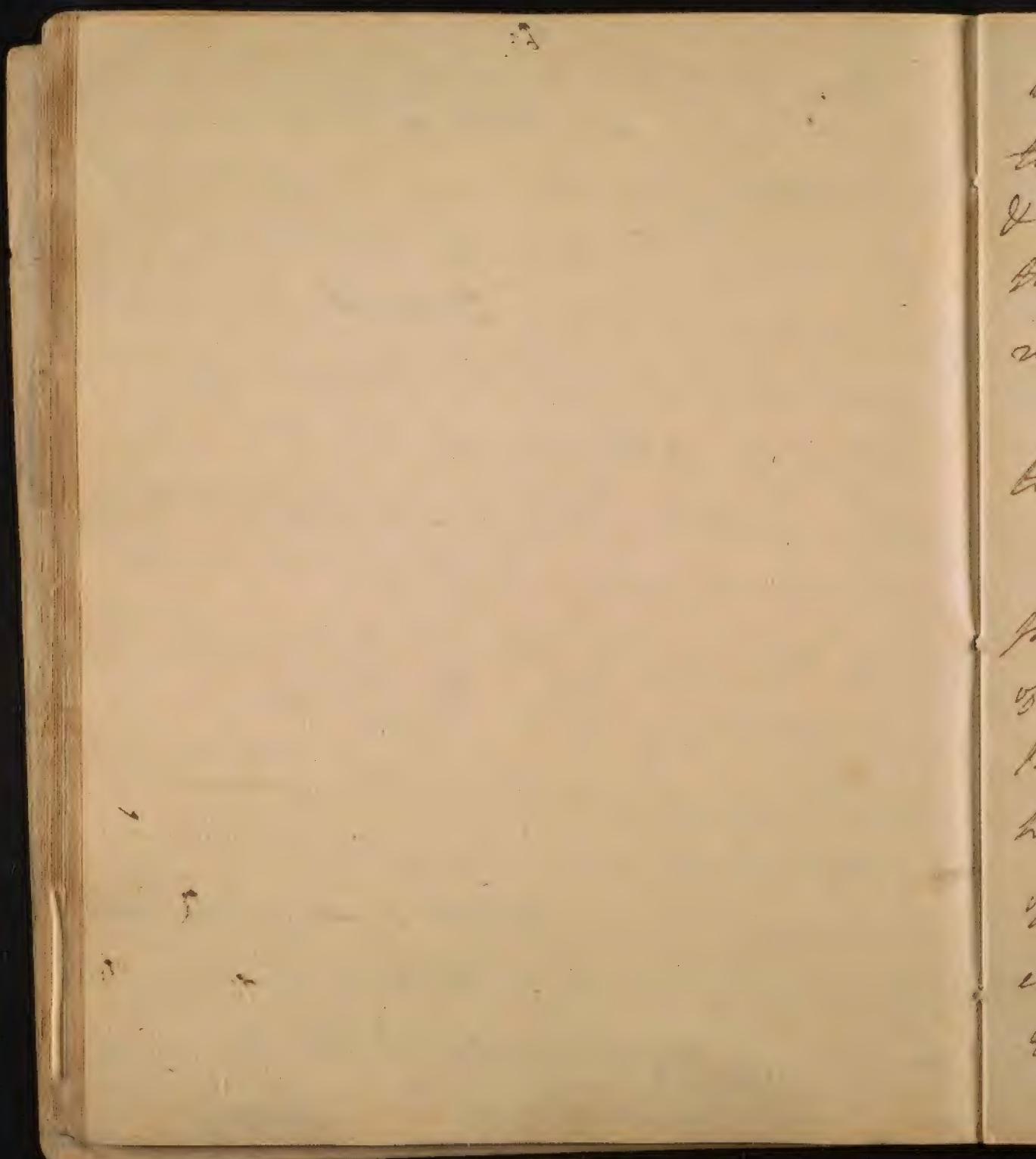


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Speedy & perfect Solution in the stomach
by means of the gastric juice - now,
heterogeneous liquids, ferment much
sooner than heterogeneous matters of a
more solid nature. — ~~Book 2~~^{by} The
~~Action of the saliva upon the food p^{as}~~
~~under~~ a ferment and thus promotes
its fermentation. That the saliva is
a very essential ~~Digestion liquor~~
~~promotes fermentation~~ in the process
of digestion ^{from the quantity excreted 3xii in a day & 2/4oz.} I infer from the waste of it
being so generally attended with indigesti-
on. This is evident in great numbers
& chews of tobacco — some years ago
a certain fruit gum was used as a
masticator by the natives of Spain to
perfume their breath. It ~~was~~ produced
this effect, but it spread Dissipation,



& Hypochondriasis among them. But I go
further, and add, that ^{the Saliva} it acts as a fer-
ment upon the Aliment in promoting
digestion. This I infer not only from
the experiments of Dr Stahl, Boerhaave,
Hoffmann & Mc Bride, - but from the
following experiment made by my-
self. I took two pounds of mutton
& bread - consisting of 3lb each & put them
into separate Vials. To one of them
I added ^{healthy} 3sp of Saliva - to the other half
an Ounce of water. I then ^{exposed} placed each
of them to the same degree of heat in
a box of sand in which I had placed a
thermometer so as to keep the heat
as nearly as possible at the tempera-
ture of the human body. In five



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hours the mixture with the saliva began
to ferment, - in seven it became sour
& in twelve it became putrid, - while
the mixture with the simple water
remained unchanged for 20 hours.

I repeated this experiment a ^{2d} time - and with exactly the same issue.

Thus far gentl: have I mentioned ~~any~~
presumptive arguments only in favor
of ~~ferment~~^a being essential to digestion.
But I shall not leave the controversy
here. To decide it beyond all possibility
of contradiction, I tried the following
experiments - not upon hawks - owls
eagles - dogs - cows - horses [or even
upon Dr Steven's Husar soldiers] but

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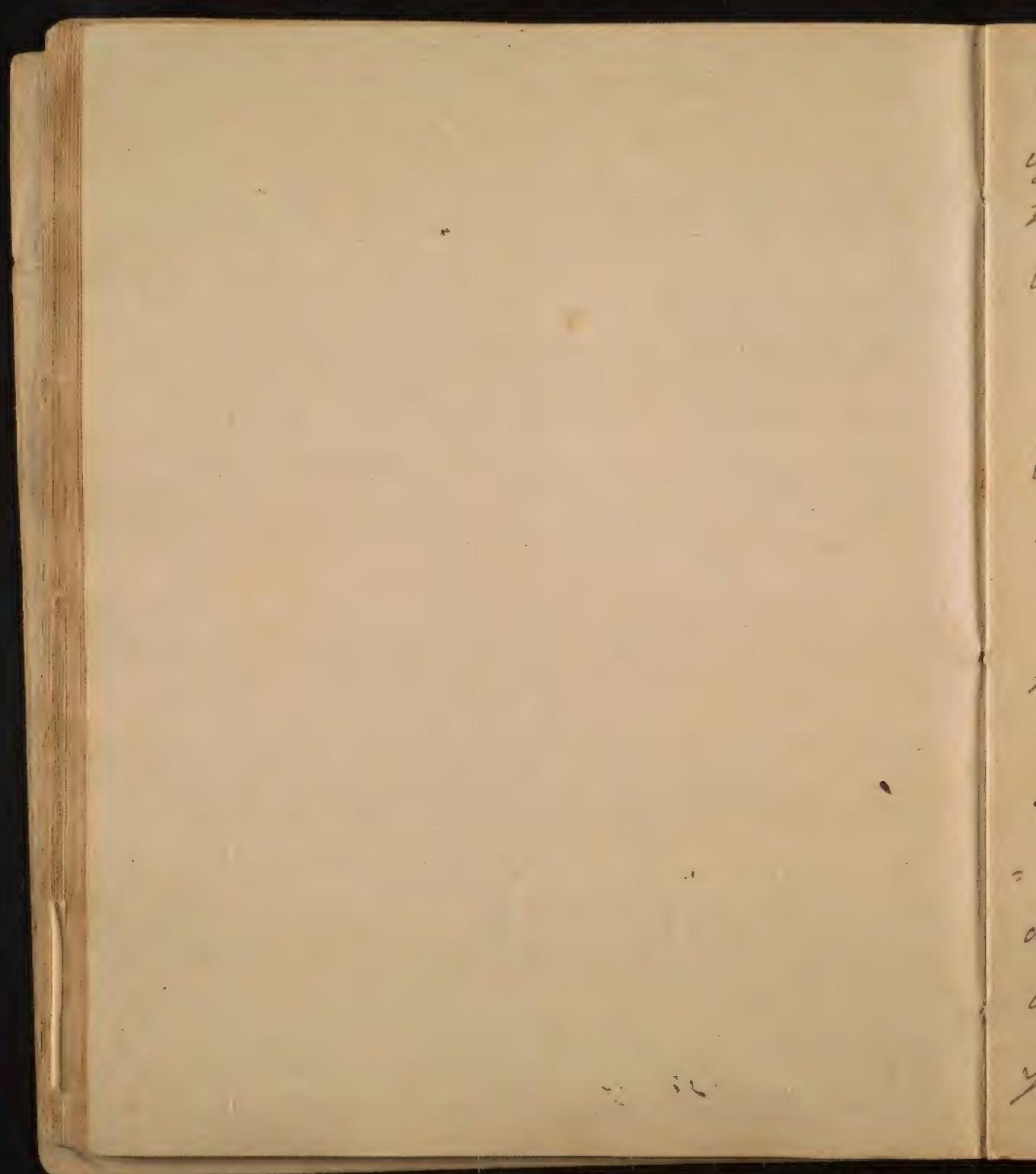
Contents 638

upon the ~~abdomen~~ of my own stomach,
at a time when I enjoyed the most
perfect health.

Exp^r 1,

Having first taken a few grains of Salt of F in
order to destroy any remains of an acid in my
~~stomach~~ dined upon Beef - bread - peace
Hamburgh after my last meal, I
~~& small roast beef - three lbs~~
dined upon Beef - bread - peace & small
beer. Three hours afterwards I took
two grains of Tart. Emet: & threw
up the contents of my stomach. They
were acid to the taste, & imparted a
red color to an infusion of a blue
flower. Exp^r 2

Having taken Salt of F as before, I
dined on meat - bread & peace, & drank
water only with them. Three hours



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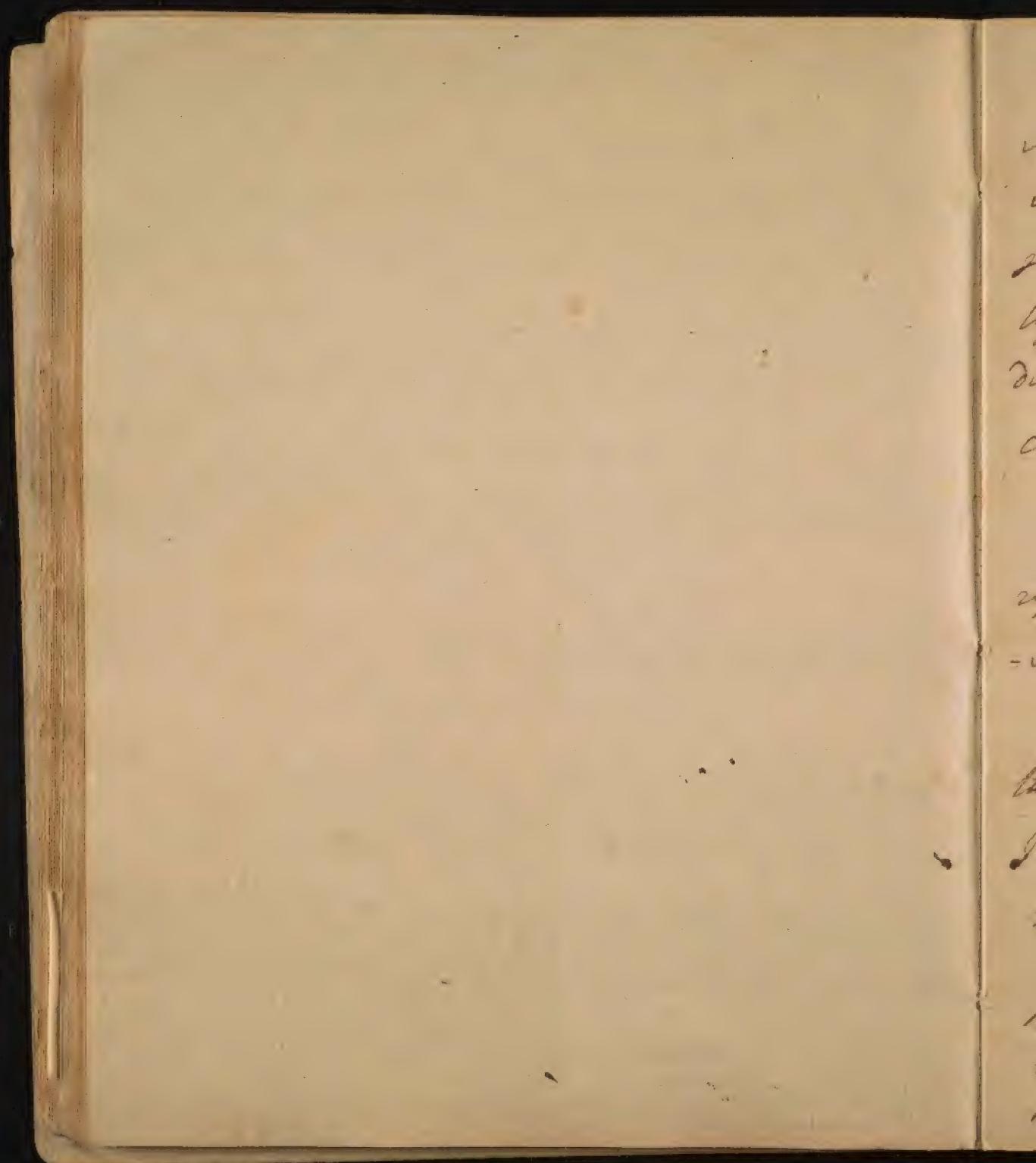
Afterwards I vomited. The contents
of my Stomach were sour, & produced
the same red color upon being mixed
with a blue vegetab.^{le} infusion.

Exps^r 3.

Having dined on poultry - cabbage - and
unleavened bread, I took a vomit ^{at} three
the usual hours afterwards. The vomit
was exactly the same as in the two
preceding experiments

Exps^r 4.

Lest it should be inferred that my sto-
-mach ^{was} ~~if not~~ disordered - or possessed
an acid diosyncrasy - I consulted upon
one of the most healthy & ~~young~~ ^{D. Penny}
young Englishmen in the University
of Edin^r, in the year 1767 to find me

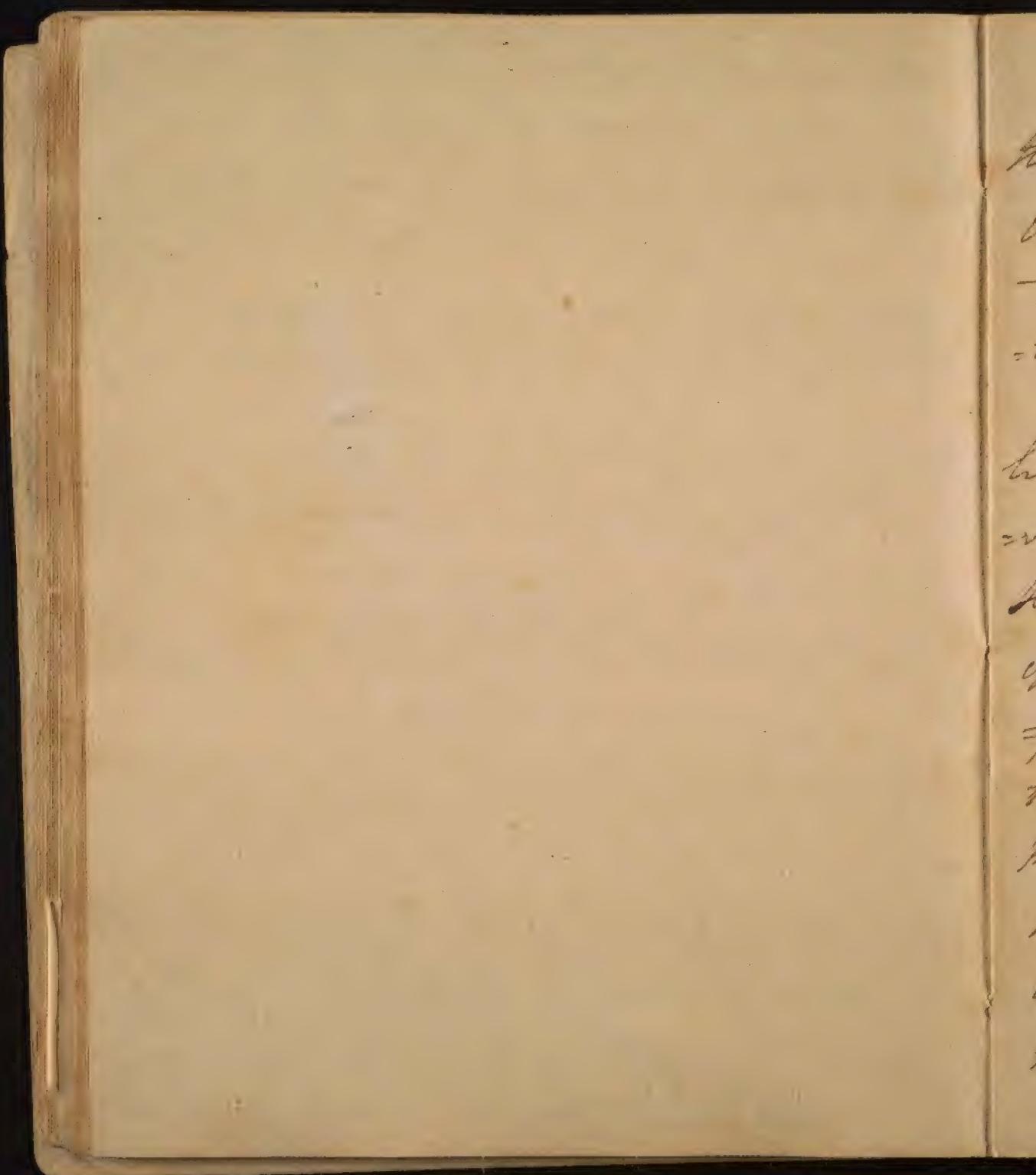


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the aid of his stomach in pursuing my inquiries into this subject. He dined with me on duck - beans - & drank small table beer with them. Thereupon afterwards he vomited. The liquor he discharged was sour - & imparted a red color to the blue vegetable infusion.

These experiments were made frequently repeated, & ~~he~~ sometimes vomited - but always with the same issue. —

I know that great pains have been taken to discredit them by a report that I was not in health when ^{I made} took them. but this is begging the question. Mr. Gopse a German Physician who has lately written on digestion admits my experiments, but ascribes the



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acid liquor which I discharged to
the right nostril the acid of tartar Amette being separated
from the Antimony in my stomach.
This ^{operation} ~~case~~ is too absurd to be contradic-
-ted. —

I concur with Spallanzani in all
he says in favor of the wonderful disso-
lving power of the gastric Juice - but
^{alone} solvation will not exchange the nature
of Aliment, or produce any new com-
-pound - much less will can it produce
the same liquor from all the different
kinds of Aliment which are taken in
the Stomach. Is there a monstrosity
in Chemistry, - that produces exactly
the same compound when mixed
with every different metals - earths -
salts - & carbon?



I ask the question again - is there
 any analogy to the Gastric Juice in
 all Nature - if we allow it to possess ^{not}
 only a dissolving - but an assimilating
 power - over the most heterogeneous
 substances with which it is obliged to
 unite in the stomach? ^{I answer there is not} -
 First for this challenge - I now recite
 = but one - and but one analogy to it -
 It is found, not in the body of Nature,
 but in ancient fable - it is the stuff
 of Midas which turned every thing
 it touched ^{hand} into Gold - And it differed only in per-
 forming this change more suddenly,
 than the Gastric Juice converts our
 Aliment into Chyle.] -

I think it probable that the

✓ I conceive this Aiid to be formed
transparently, and to serve very im-
portant purposes in the animal
economy. —

+ In explaining ~~the~~ particular functions
it is necessary to keep any eye upon all
~~processes wh: go forward whole in every part of the body,~~
~~the functions of the body~~ — Otherwise we
shall make as great mistakes as Physi-
-ologists, as those Physicians make who
prescribe for Symptoms only in a disease
without regarding the state of the whole system.

digestion in a healthy state always
 ceases as soon as an acid is evolved
 from the Aliment. ^{The} Acid which
 we find in the animal salt, and
 afterwards becomes a basis of phos-
 phorus - ~~the acid vanishes~~ appears to be formed
~~from it.~~ [and It is the ~~presence~~ ^{Absence} of this acid
 which produces the ferruginous & its pro-
 minance which forms the nucleus
 of the stone. It exists in a material
 only - and not in a formal state
 after it leaves the stomach, - for it is
^{covered} ~~covered~~, after it is changed into Chyle
 so as to not to be ^{discovered} ~~perceptible~~ by
 the common tests of acids.]

Thus have I delivered my opinion
 upon the subject of digestion - nor shall
 I yield it to Spallanzani - Stevens -

V for ~~me~~ detailing the facts & exp^r: in
favor of fermentation taking place in
the stomach, I have not availed myself
of the last fact, from the air & acid humor
which are often discharged from the
stomach in digestion - for I consider them
~~when~~ ^{obd} phenomena, to be
~~explain~~ ^{often,} ~~when~~ they depending
upon a relaxation of the stomach, and
an exp^r in the fermentative process.

~~or oppose it till they have taken
as many sides as I have done, to
establish the hypotheses they have
given to the world.~~

✓ There is but one ~~trap~~^{way} waiting
~~under establish~~
~~to establish the~~ my theory - & i.e. to ex-
-amine by distillation whether the con-
-tents of the Stomach will yield by distil-
-lation a Vivous Spirit. — If they should,
it would prove fermentation in the
Stomach ^{one of} as the cause of digestion be-
-yond all possibility of being doubted.]

¶. I shall now add a few Observations
upon the phenomena which go for-
ward in digestion. —

1 There is after every full meal
a slight fever. It is sometimes wished

Dr Brew's death which
undeservement^{is} highly
probable. He died in 1802
with yellow fever before
he had completed his
exp.

A Dog was killed his body opened and a thread tied round the duodenum just below the pylorus, the duodenum and oesophagus were then cut off the stomach immediately taken out & nearly all the gastric juice poured out, it was then filled with dough made of wheat flour & water & covered over in warm sand, of in which it was heated. Thermometer stood at 96° with the divided end of the oesophagus just above the surface of the sand, in this situation any change which might take place in the dough would be easily observed, a piece of dough was moistened with water & covered in the sand by the side of the stomach, by way of comparison - in two hours & three quarters a very active fermentation was observed in the stomach - the dough worked up & run out of the oesophagus - no change in the dough in the sand

Experiment 2)

A Cat was next killed & the stomach taken out as quick as possible to prevent it from cooking - the thread & other precautions to save the gastric juice was neglected & the stomach immediately covered in the sand - a lump of dough about the size of a walnut put in the stomach & the same quantity put in a vial containing a small quantity of water, in one hour & twenty minutes there was a considerable motion in the stomach & the dough worked up three fourths of an inch above the end of the oesophagus - no change in the dough in the phial -

Experiment 3)

Another Cat was killed & the stomach taken out this stomach contained a large quantity table spoon full of the gastric juice about two thirds of which was poured out into a phial - equal parts of dough was put into the stomach & phial - the phial was used by way of comparison - in one hour & twenty minutes the dough in the stomach shew signs of fermentation the working increased & in 4 hours the fermentation was so considerable as to force $\frac{2}{3}$ of the dough out of the stomach - it was compared by a bystander to the working of a barrel of Cyder - the motion continued until 6 hours at which time the sand was suffered to cool - not the least signs of change or motion appeared in the dough in the phial



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in with a slight degree of chills & shivering,
and in weakly people it is often accom-
panied with a gentle sweat. This fever
is occasioned by the stimulus of ~~of food~~
meal being overproportioned to the
excitability of the system produced by
hunger. — It is not necessarily con-
nected with eating — nor is it pro-
duced after a slender meal. The know-
ledge of however of the existence of this
fever, may be applied to several useful
purposes. — It should lead us to recom-
mend a plentiful meal to all persons
who are about to be exposed to the
cold in ^{a situation in} ~~expecting~~ which they
cannot use exercise ^{much} ~~in a small~~

v for the time is now yet come when
philosophy can aid either war or
government.

pamphlet which I published during
 my attendance on the military hospitals
~~for~~ entitled "Directions for preserving
 the health of soldiers" I recommend
 in strong ~~for~~ terms that a soldier
 should never do the duty of a sentinel
 in cold weather, but after a ~~full~~^{hearty}
~~meal.~~ ~~but I am sorry to say that this advice~~
~~is not followed.~~
 2 There is frequently a disposition to
sleep after a full meal. This is owing
 to the fulness of the food producing
 depression in the brain ~~and~~ coma, or the
~~loss of activity~~ tending to the ~~loss~~
~~health of the~~
~~body.~~ It is most commonly removed
 by the additional fulness of ~~from~~
 tobacco in the form of snuffs or
 cigars or by a few glasses of wine.

100

This flappiness is not necessarily connected with eating. It never succeeds a moderate meal. Lewis Carroll tells us that after he adopted ~~the~~^{the} now & temperate mode of living ^{w.} ~~he~~ restored his health, & prolonged his life to the most extreme old age, he found no disposition to sleep after eating.

3 The mental faculties are generally affected by a full meal. But this likewise does not follow a temperate repast. Lewis Carroll used to ~~exchange~~^{knifed forth} his ~~books~~ for a book, or his pen & ink, & never found any inconvenience from it after he began to live a life conformable

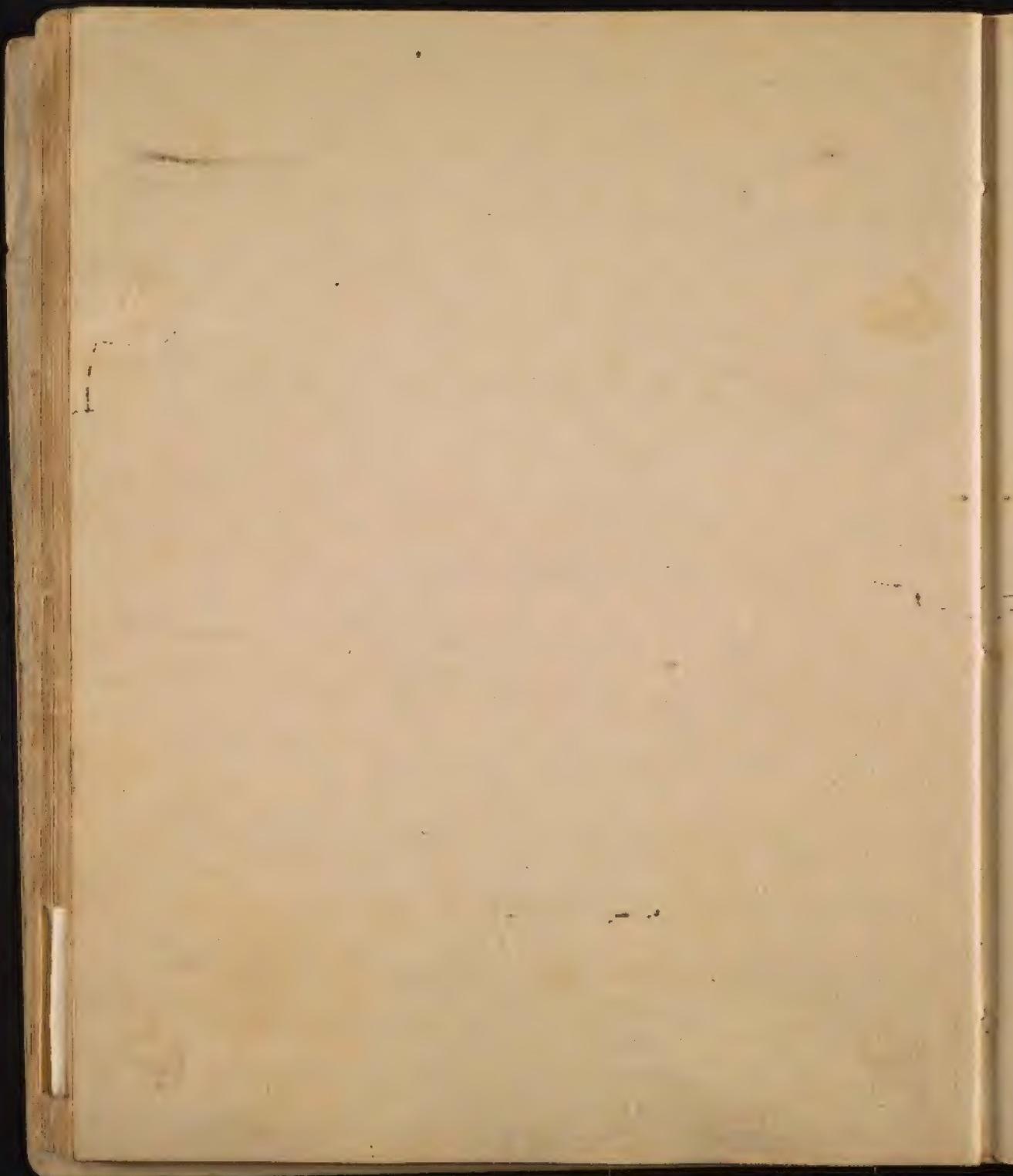
6 V. The food generally lies from 1 to 7 hours
in the stomach according as it is more or less
~~soft~~ easy of digestion. Its time is from 13 to
hours ~~and~~ as it is animal or vegetable.
~~and~~ shall hereafter mention
instances of ~~solid~~ little substances lying
days - weeks - months & even years in the
stomach without being digested. p 2. 649 =)

to reason & nature. —

4 There is generally a disposition to rest after a plentiful meal, ~~in purifying digestion~~

D'Uamoroff of Cambridge proved the advantages of rest by the following experiment. He gave two pointers a hearty meal of flesh. One rested; — the other ran two hours after eating. He then killed them both. In the former all the food was digested; in the latter it was scarcely begun.

5 The state of the air influences digestion. The inhabitants of Swiperland digest aliment upon their mountains which they cannot digest in this valley, nor upon this plain. ✓
man o man preserve for a chronic



~~disease, without enjoining my patient
to make six or seven small meals,
instead of two or three large ones in
a day. There are many instances
of fevers - & sometimes of sudden death
of apoplexies & palsies following full
meals, in persons of delicate health
and cases of sudden death from the
same cause I have said~~

=17 The passions have a great influence
upon the digestion of the food. It is invi-
gorated by cheerful cuffs - hence we feel
lost in convenience from full meals
which are followed by cheerful con-
versation. ~~Oppression & irritation~~
It is retarded by grief - fear - and
shame - The passions seem to act
only upon the muscular fibres of

✓ Is there ^{not} a participational affinity
of the Electroic fib. fluid of the nerves
to the stomach which accelerates
the fermentative process, & thus im-
pairs the digestion? It seems probable
from an exp^r related by Dr Johnson.
If the 8th pair of nerves which goes to
the stomach be divided, digestion is
immediately interrupted, & the food
stands on the nature of feces in the
stomach.

✓ ~~you~~ some of you will perceive
gent. I have ~~changed~~ rejected ferment^t
from being one of the causes of the

of the Stomach. In the former case the Stomach is assisted in propelling the Aliment after it is digested into the Pylorus; - in this ^{latter} case, the debility of the Stomach induced by the relaxing spasms prevents its acting with its usual force in throwing the food out of the Stomach.

The Aliment ~~when~~^{when} it is digested is called Chyme. After it passes into the Duodenum it is mixed with the bile. The cystic bile is said to ~~not~~^{not} precipitate its fecal parts from it, and imparts to them its peculiar color. It is now called Chyle.

I have thus mentioned the means by which Chyle is formed by the Stomach, but it requires the aid of another viscous to render it fit for

V off certain excrements ~~in~~ ^{matter} from the blood.
In answer to ~~this~~^{the} opinion,
I shall only say the ~~in~~ ^{on} nature and in answer to
the world, I shall ~~now~~ now ~~say~~ ^{say} before you
~~say~~ ^{say} some facts intended to prove that the liver serves a
higher purpose than to discharge ~~any~~
~~any~~ ^{any} thing of a fecal nature
from the blood. go to account of the
liver p: 16.

composing perfect animal nourish-
ment. This visus I believe to be the
Liver. The common opinion of the
Office of this large & noble visus is
that it is intended ~~for~~^{to} to furnish
a fluid which by mixing with the
~~body~~ Chyme that descends from the
Stomach forms the Chyle. The Chyme
was supposed to be of an Acid na-
ture, and this acidity was said to
be destroyed by the bitterness of the bile.
This opinion was founded upon some
experiments made by Dr Ramsay of
Edin^r and was taught by Dr Cullen.
2 The Liver was supposed by some
Physiologists to be a large excretory
visus intended to separate & throw ^V



Of the Lymphatics or Absorbing System.

Upon this subject you are not to expect a minute detail of all the Opinions & controversies which ~~exist~~ are to be found in books. ~~such a detail would be~~ ^{such a detail would be} of no use, as it would be tedious. I shall relate only such facts & principles as appear to be true, and deduce such principles only as ~~do~~ admit of being applied to pathology & the practice of Physic. —

By the Absorbing system is meant the Lacteal as well as Lymphatic vessels. They are alike in so many particulars, ^{that} they have been designated by one name. They both open into cavities of the body — they have the same structure. They pass thro' ~~the~~ glands in some cases,

p. 654 before
Lymphatics.

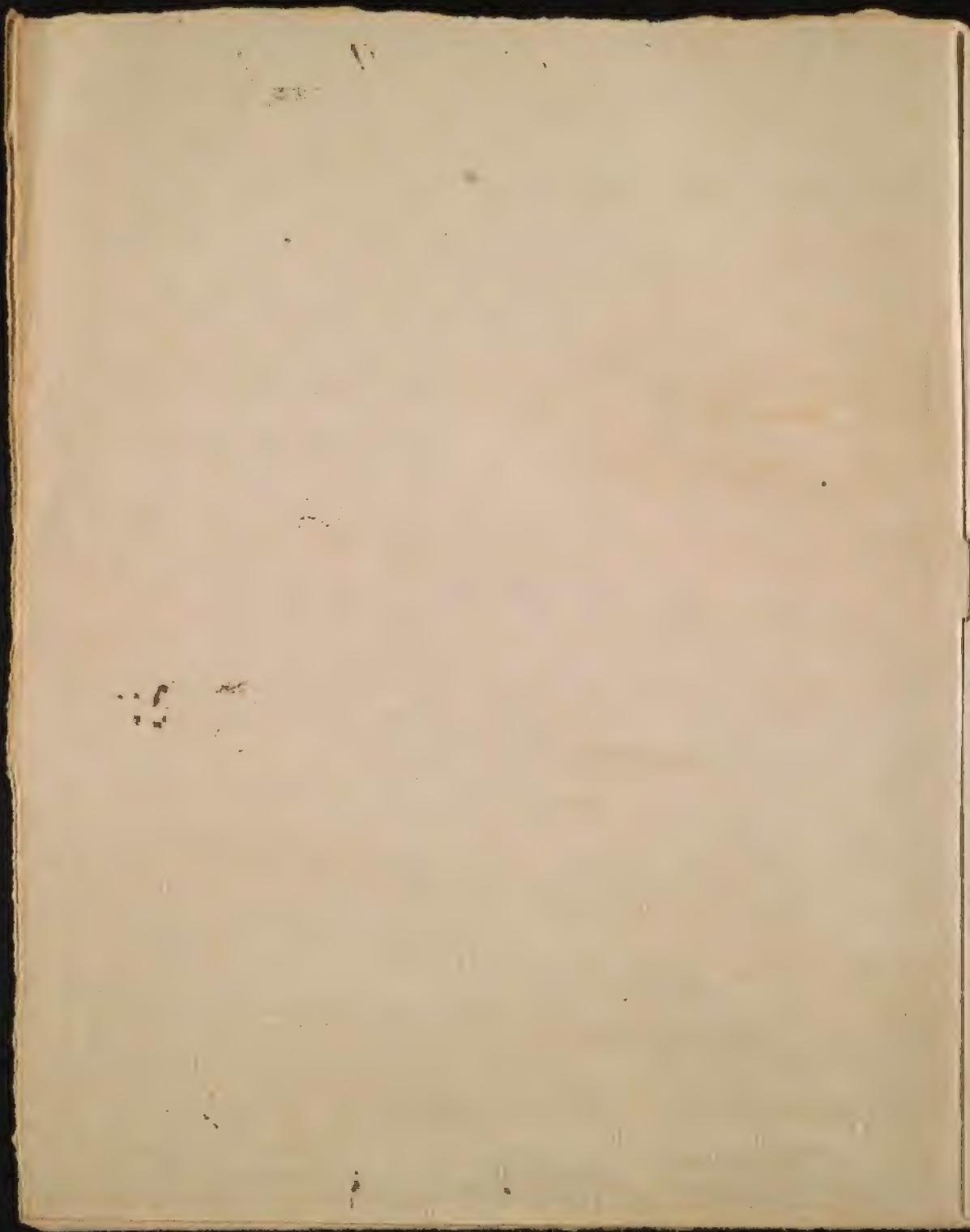
'of the Chyle'

We return to pursue the Chyle which when formed by ~~in the~~ ^{in the} ~~an~~ ~~er~~ ~~that~~ has been described is conveyed ~~by~~ ^{through} certain vessels distributed plentifully ~~through~~ ^{through} the small, and issuing by this the large gutts called Lacteals from the milky color of the chyle ~~they~~ which pass through them. These lacteals have been supposed to perform the office of Absorbents by some Physiologists, while others suppose they perform the office of secretory vessels, and that ^{they induce} ~~they contract~~ by their action a change upon the Chyle analogous to that which a gland imparts to the

1
2
3
4
5
6
7
8
9

2

fluids which enter into them. The Chyle
whether admitted into the Lacteals by ab-
sorption or secretion is conveyed by them
thru the ~~the~~ ^{the} ~~intestines~~ into a large canal called
the Thoracic Duct which runs along the
vertebrae, and is joined from it into the left
Subclavian Vein in which it is mixed
with the blood, and conveyed to the heart.
By what process it acquires all the properties
of blood ~~is~~ remains yet to be
explained. Dr. Hutchinson has thrown some
light upon this mysterious subject in his
ingenious inaugural Dissertation. He has
discovered by many experiments that the
Chyle is coagulable in the thoracic duct,
and after it enters the arteries, but that



it puts off its evaginating ~~from~~ ^{quality in} the
veins. From this you see it acquires
one of the properties of the blood in the
thoracic duct, and in the arteries; but it
~~is~~ ^{is} deficient in others. It shewed
~~no~~ marks of what is called
vitality, or ^{what} I have
called animatization of the vegetative
lymph of the blood, when subjected to gal-
vanic influence. The Doctor supposes
further, that the blood like the bones
and muscles possesses a power of conser-
ving the matters which are brought
into contact with it into its own na-
ture, and hence he says the cause of



Pneumification.

The fœtus when precipitated from the Chyle goes slowly into the larger gut. These are expansions, in order to prevent the ~~explosion of~~
~~dead~~ inconveniences of our frequently discharging them. In old age they stagnate for many days without much injury to the system; on the contrary, they probably perform the offices of those flintlets which have ^{to} used out, or have become futile in old people, and thus help to keep up the actions and machinery of life. The stagnation of the fœtus in



The intestines of carnivorous animals are much shorter in proportion to the length of their bodies than in granivorous ~~or~~ ~~animals.~~

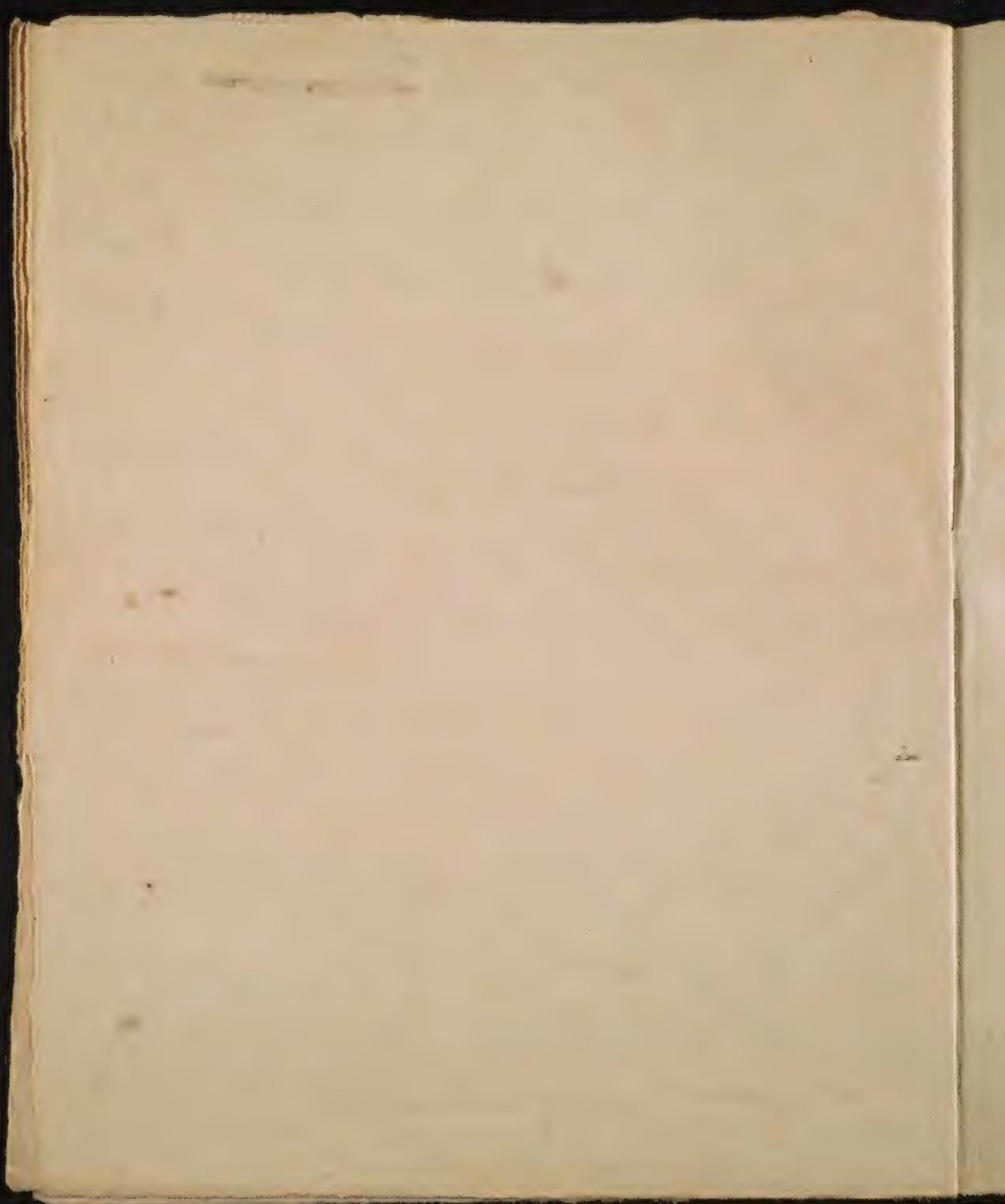
~~but~~ ~~as they do not eat~~
~~so~~ ~~they do not eat~~ ~~as~~ ~~if~~
and
~~but~~ for obvious reasons. Vegetables afford their nourishment more slowly & with more difficulty than animal matters, hence they require more mastication - longer digestion from one or more stomachs & a longer course of lactals to absorb the chyle formed by vegetable food.

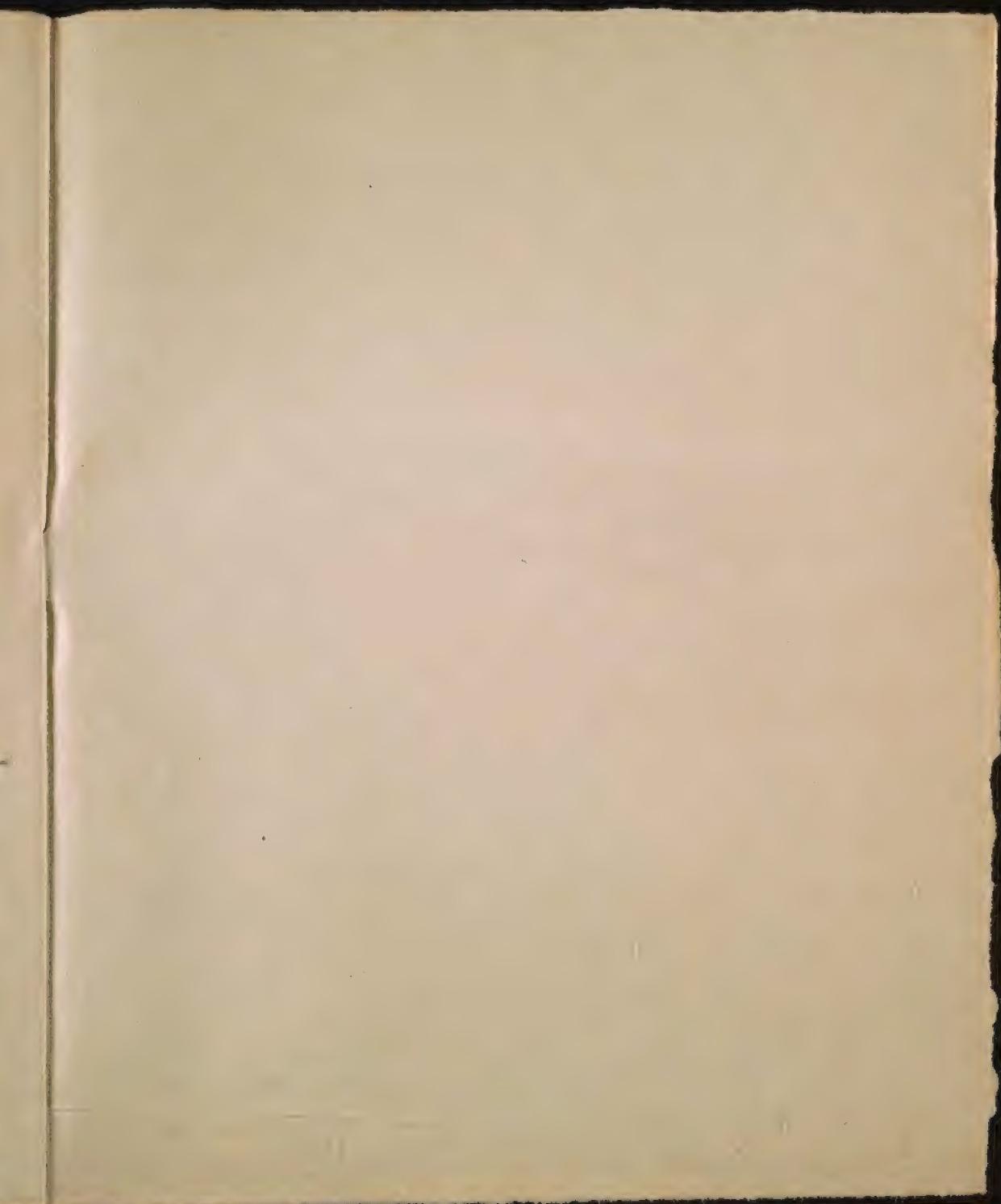
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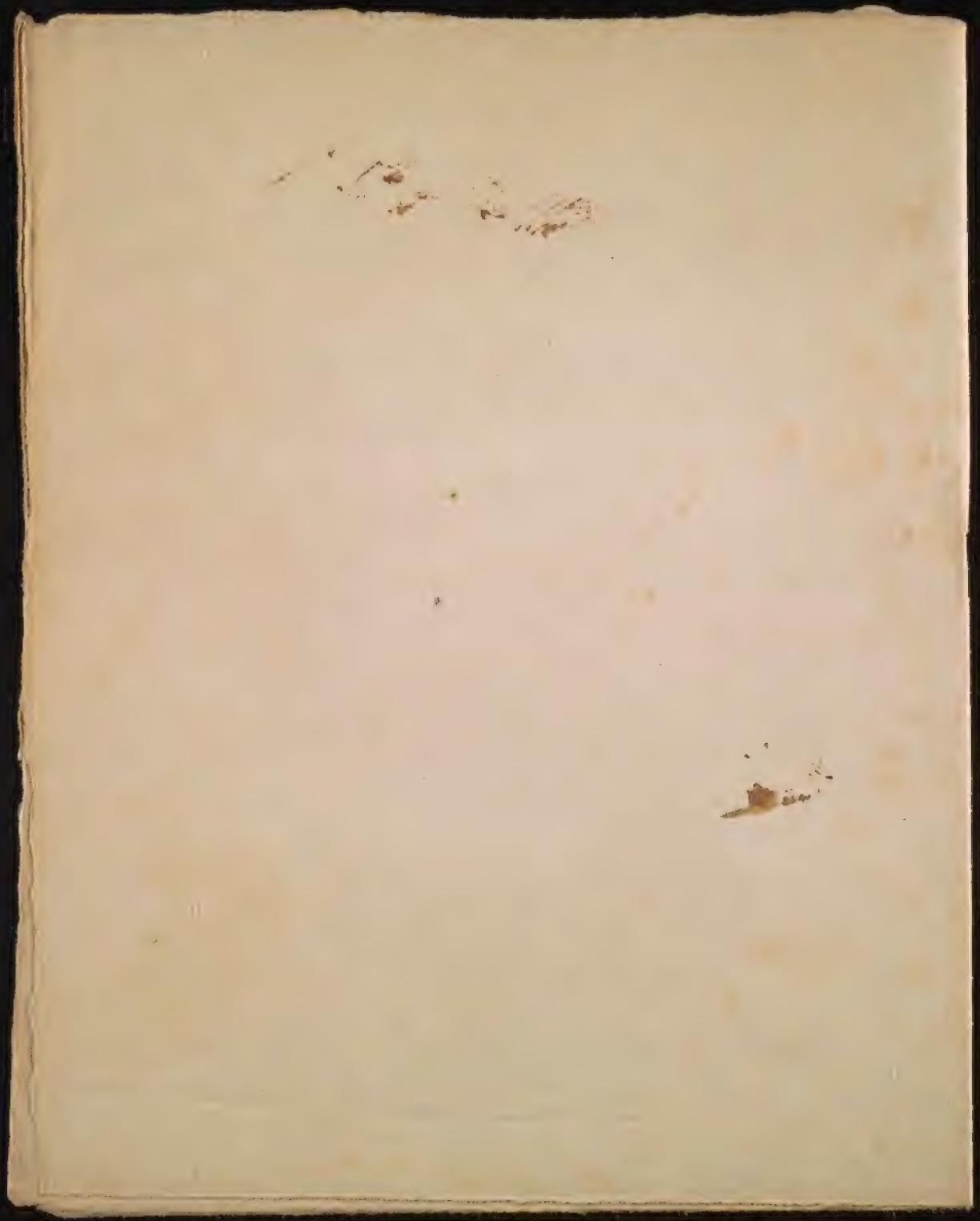
the bowels of old people ~~are~~ seems to be
color, and hence the reason probably
why the wind discharged by them is
less offensive than in persons in
whom the farts are constantly lodged in
the Rectum. ✓

we proceed next in order to speak
of that fluid which is formed from
the Chyle, and that is Blood.

~~to be past~~







~~it~~ ^{to} offensive, as it is in childhood & middle life.

~~We should proceed next in order to you will perceive that I have taken no notice of the Office of the Liver. It~~

~~blood~~
~~treat of the Lymphatics, but before we take leave of the ~~functions~~ of the functions of the viscera, there remains one, upon the~~

~~use of which Physiologists have been divided or silent since the ~~function~~ birth of our species, I shall speak of the Spleen. I shall attempt to explain its use by deriving ~~as~~ a impression upon it, since some of the Lymphatics do not~~

~~it has been supposed pour this contents into the Thoracic Duct, but Dr. Brown ~~too~~ believes that this is the case extracting the blood vessels in other places. This~~

~~from the following experiment. This~~

~~has been proved by Dr. Moore by a simple exp. - he cut up the thoracic duct in several ~~two~~ animals, and put them up upon madder~~

~~the he found tinged ~~the~~ bones. It has been~~

~~several other facts favoring this a ^{opposite} opinion related by~~

~~Professor Estell, by a ~~dissector~~~~

~~Mr. Richardson ~~too~~ applied a small quantity~~

~~of G Dinctuent to the ~~leg~~ of a young man,~~

~~soon afterwards he observed the salivary glands ~~and~~ ^{too} the ~~leg~~ on~~

Upwards by them in others & they ~~are~~ have valves - they differ ^{slightly} in conveying ~~fluids~~^{fluids} of a different quality to the thoracic duct.

(~~Having mentioned~~) ~~the use of~~ ~~the lactals formerly,~~
~~it remains only to speak of the lymphatics~~
~~which are vessels of the body, which~~
~~they are called. They are a system of~~
~~small vessels originating from all the~~
~~glands, and from the cavities of the~~
~~body, which frequently anastomosing, enlarging~~
~~& contracting~~
~~thru a series of glands called conglabate,~~
~~then~~
~~discharge their contents into the~~
~~thoracic duct, which empty them into~~
~~the ~~opposite~~ veins of blood in the manner~~
~~formerly mentioned.~~

The following circumstances demand attention with respect to these vessels.

1 They appear to possess coats analogous

~~left side to be affected by it. The right side of
the mouth & tongue were wholly unaffected
by the ~~g~~. These facts are important, as they
show that certain medicines may be introduced +
moreover~~

✓ The fibres of these coats, possess great
irritability, - inasmuch that according
to Dr Haller ~~as~~ they disappear altogether
when they are stimulated, ~~as~~ even tho'
they be filled with their natural, or th
any artificial liquor. -

+ into the system without mixing w.
~~the blood, or entering the general circulation.~~
It is thro' the lymphatics only that
liquids pass to the kidneys from the stomach,
and hence the ^{rapidity} of their passage. A
direct communication is not necessary
for that purpose. -

+ In the course of this year 1808 I attended
~~a young goat in the last labours before~~
for the disease. The ~~goat~~ was splitting &c

to the coats of the blood vessels & one of which
 is evidently ~~was said to be~~ muscular. This appears
 from their alternate dilatation & contraction,
 and 2^o from their being liable to pain -

& swelling & inflammation. These coats are
 much stronger in proportion to their size than the
 coats of the blood vessels. V
 They are all endowed with valves placed
 in some cases at a small, in others at
 a large distance from each other, which
 prevent the reflux of the lymph, in the
 same manner ^{that} the valves in the veins
 prevent the reflux of the blood.

They are all endowed, not only with
 veins, but with arteries veins in which
 the circulation is carried on with the
 same regularity in the largest vessels of
 the body.

~~If we consider the anatomy of the vessels, it has~~
~~been supposed that they are~~
^{the minister of}
^{with respect to}
~~animals~~

~~Occlusals were on one side of his mouth only - and
the sores were healed on one side that side only of
his penis by the application of & to them. #
& matters until they have first been dissolved
by a liquor secreted by the arteries.~~

~~# In Dec² 1911 I attended a gentleman from
New Jersey, Judge Berger in a party, who had been
salivated by his physician ^{and especially}, the & affected the
longer side of his mouth only. I then
deemed ^{presently} to give a different explanation
of these facts in ophthalmology. — A~~

V6 They are said to possess a retrograde power
— by which we and their contents are
propelled in a contrary direction to that
which is natural. ~~retrograde~~ Dr. D'Anna
Dr. ^{retrograde} has furnished many facts in favor
of this motion in these vessels. & his father
has explained many of the phenomena
of diseases from it. see this work.

~~T Hopper made which and has lately
mentioned a fact which shows that the
lymphatics convey matter to remote
parts of the body, without without~~

an opening which has been called a mouth with which they not only absorb liquids, but feed as it were upon solid matters such as ~~the~~^{still more} blood-flesh, & even bone. What makes it probable^t that they possess mouths, is that they have

been demonstrated in several fish (Dr Monroe supposes the lymphatic does not develop these) that

5 The lymphatic glands appear from filling them with $\frac{1}{2}$ to be cellular, but Dr Monroe has demonstrated that they are composed of convoluted vessels. Mr Henslow however thinks he discovered a cellular structure in some of the smallest glands. It is certain that the blood vessels - nerves & the small cells of the smallest gland are connected together by cellular membrane.

Having delivered these general observations, we proceed next to inquire in what manner the lymph which is carried

P. 65

A Upon Dr. Horne's exp^r of the facts I have related I shall
in the mean while I shall only remark
that Dr. Horne I believe that the ^{coloring matter of the} madder
~~penetrated~~ thro' the solids of the body, and matter of the
mucilage as it does of the ~~body~~ in Dr. Horne's
exp^r and thus found its way into the general
circulation by which it was conveyed to the
bones. The same thing probably took place in
the exp^r of Mr. Horne where a rabbit in
which he tied up the ^{first before it entered} thoracic artery at the
junction between the left left angular
& subclavian veins, and afterwards gave
injected $\frac{1}{2}$ of strong infusion of Rhubarb,
in $3/4$ of an hour, the urine was voided,
& the presence of Rhubarb detected in it
by the addition of potash to it. It passed
into the gall bladder in Mr. Horne's 2nd
~~exp~~ experiment in a dog in the ^{same} way.
That the effect nothing can be

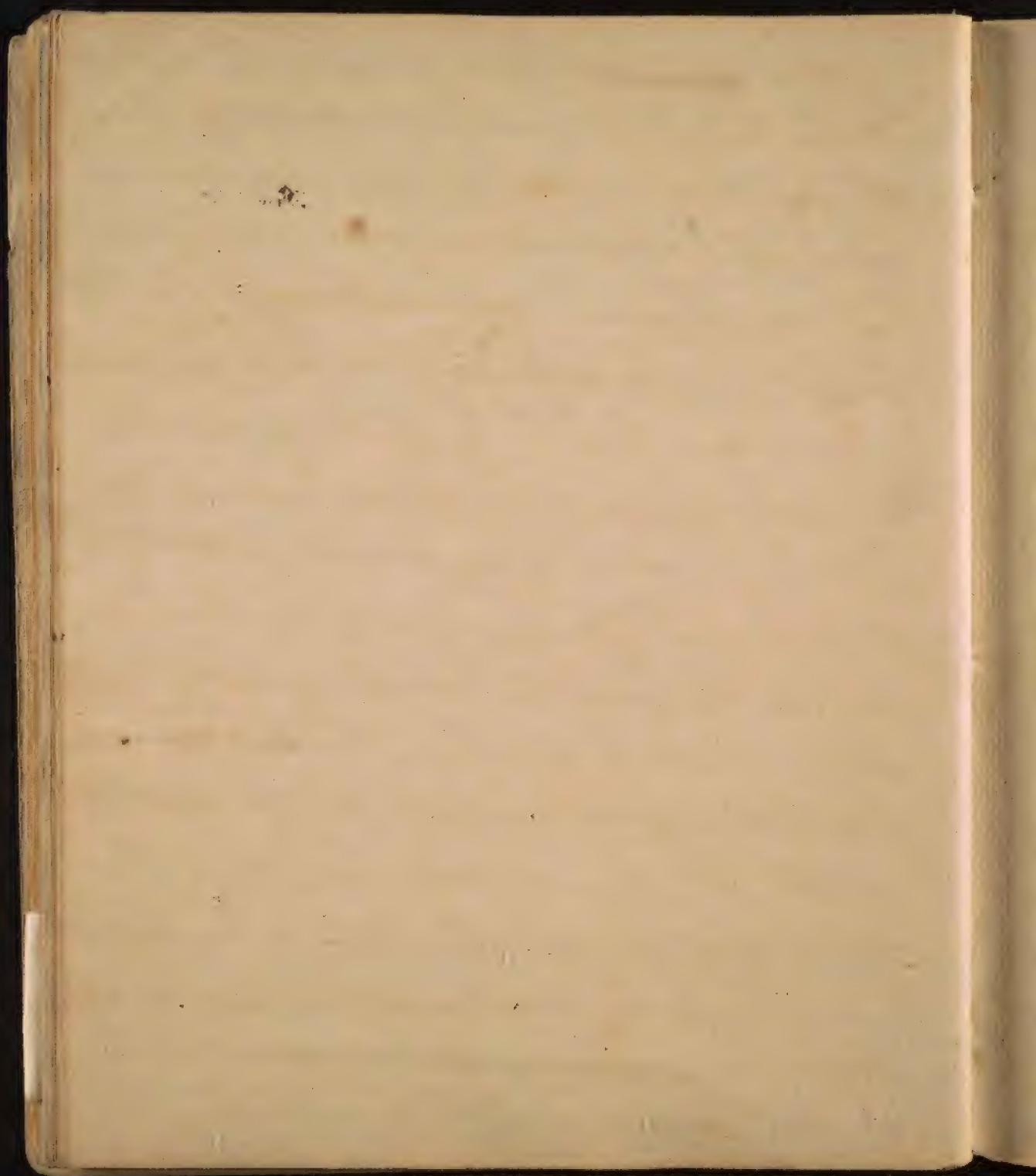
inferred in favor of Dr. Monroe's opinion
from & affecting but one the lymphatic

~~this comes true.~~ my dear account informing
glands of one side only. I hope in our pa-
-thology to give a more satisfactory ~~explanation~~^{explication}
of these facts. I w^t only remark further,
~~you notice that~~ ~~I send to you a copy~~ ~~now~~ ~~for~~
that I do not think that we require a passage
from the stomach to the kidneys to account
from the ^{widens} rapid excretion of urine after the
stomach has been overcharged with
watery liquor. It may be explained
upon another principle to be mentioned
hereafter.

the intervention of the thoracic duct. By applying galvanism to the ~~leg~~^{left} ~~face~~^{of a} young man, he affected the ~~salivary~~^{glands} of the left side only, and one half the ~~tongue~~^{left} with those aphous ^{sores} which attend a salivation - the right side was wholly unaffected with the G.

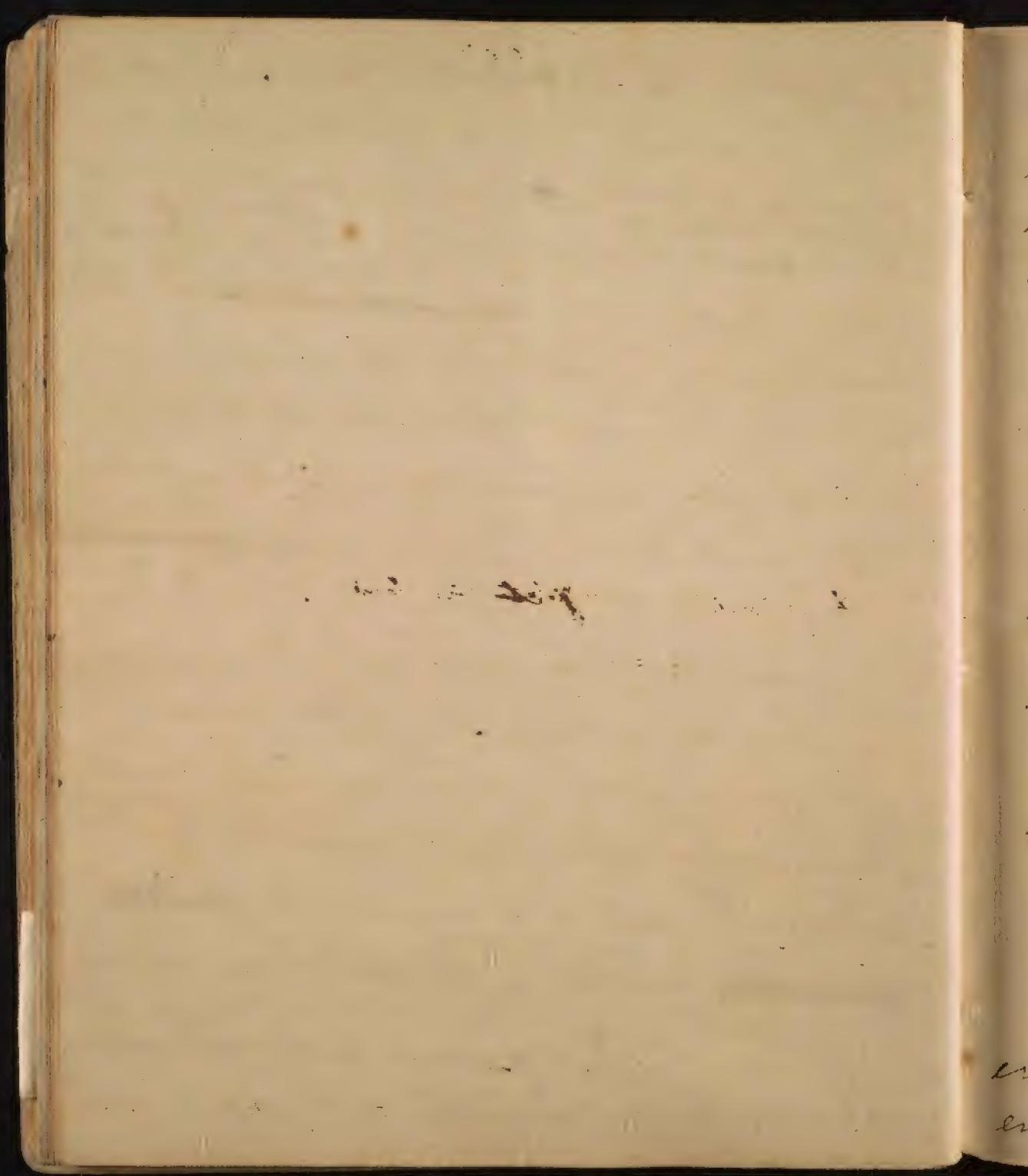
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by these ~~lungs~~ vessels to the heart is found
in the different cavities of the body. Formerly
it was supposed to be an exudation
from the extremities of the arteries,
but Mr. Wilson has made it ^{opinion} probable
that it is a secreted liquor. This he inde-
vours to establish by proving that the
lymph is of a coagulable nature, &
that it partakes of most of the properties
of the ^{living} coagulable lymph of the blood. This
coagulable quality belongs equally to the
fluid which is found in the ~~exterior~~ vessels
with that which is found in the cavities
of the body. He infers it from the
diseases to which this fluid is liable,
all which he ascribes to the disordered
state of the ~~exterior~~ vessels
which secrete it. E.g.: In a Dropsey the



Lymph is less evaporable than in health. This he ascribes to a relaxation in the secretory vessels. Again, we sometimes find ~~the~~ surfaces of the pleura - trachea - diaphragm & even the ~~inside~~ ^{inside} ~~parts~~ of the heart covered with a crust which resembles the sicc or buffy coat of the blood. This Mr. Henson supposes to be produced by too much tone or action in the ~~vessels~~ which secrete the lymph - & lastly - he supposes this to be nothing but the product of a certain degree of inflammation in these vessels. - This opinion concerning my friend for me in this chair was first suggested by Dr Morgan, and it is now I find ~~mostly~~ many adopted by Physiological writers.

In what manner is the lymph when secreted taken up by the sympathies?



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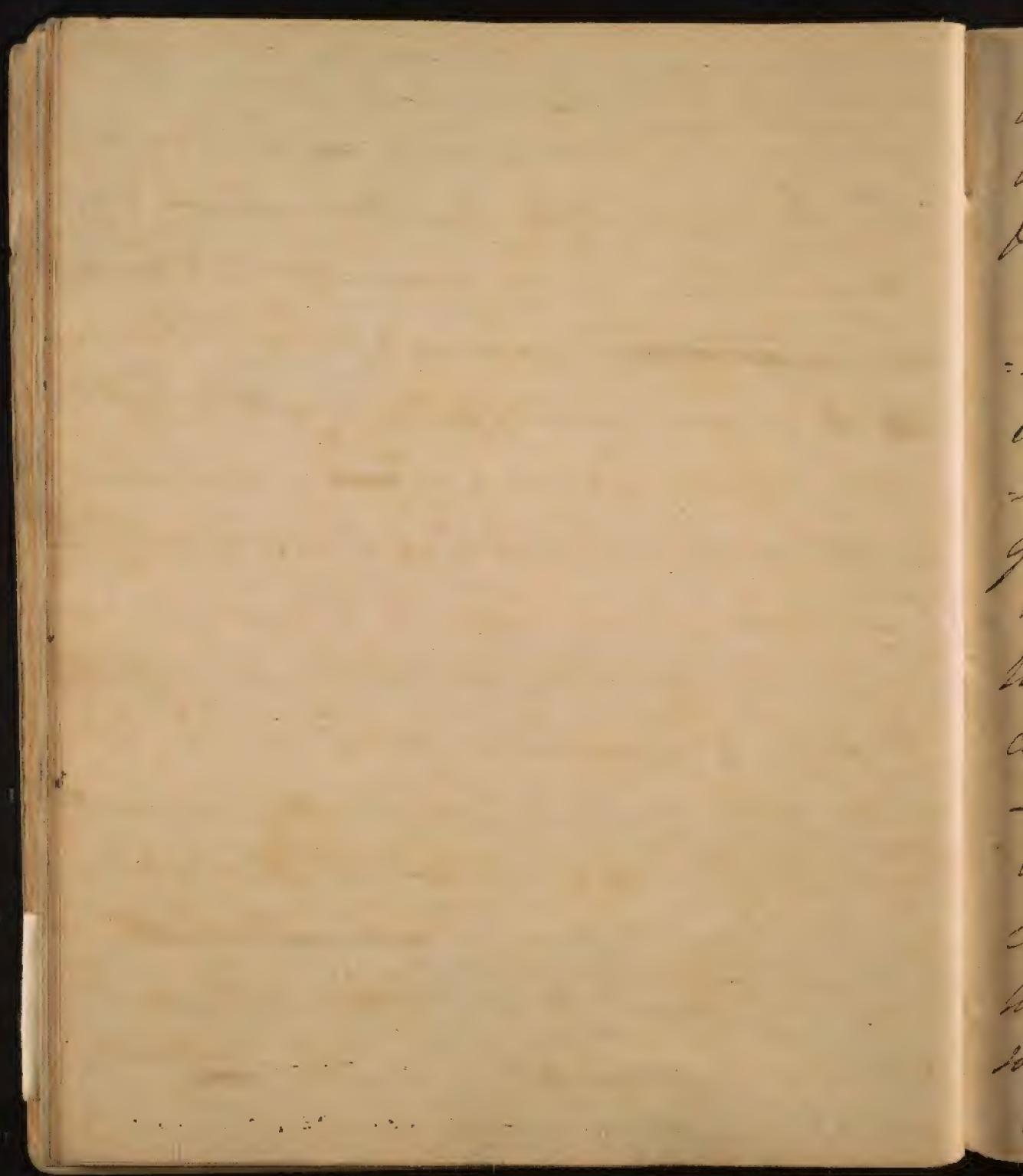
It has commonly been supposed by means of capillary attraction - beneath the name of Absorbents - but I would rather suppose that it is by the effect of muscular contraction excited by the specific stimulus of the lymph, or matter taken up, upon the mouthes of the Lymphatics. -

In what manner is the lymph when it enters the Lymphatics conveyed to the ~~and throughout~~ body? I answer - 1 by the pulsation of adjoining Arteries - 2 by the pressure of contiguous muscles - and 3 by the fibres of the lymph acting specifically & mechanically upon the lymphatic vessels in every part of their course.

Are lymphatic reflexes found in every part of the body? I answer in every part except the head, and there

V 3rd From the cures which have been
made of the Hydrocephalus internum,
which dispositions prove to arise from
an effusion of water in the ventricles
of the brain. — ff.

666 from the following
existing there is presumed,¹ from the
circumstances.
analogy in certain fishes & particularly
the platte in whose head Dr Monroe dis-
covered them many years ago 2^o. From
~~the history of a~~ disease related by M^r Hanson.
A man was affected with a slight
palsy of his left arm - ~~with~~ a hesitation
in ~~his~~ voice & a trembling of his lips. These
symptoms were supposed to arise from
some compression in the brain. A swelling
in a lymphatic gland in the left
side of the neck which finally suppured,
~~removed~~ all his complaints. Probably
by the translation ^{an effusion from}
^{or cephælia} of ~~water~~
an internal to an external gland,
It is presumed from the ~~certainly~~
that the veins in no part of the body



absorb lymphatic. This has been proved by many experiments made by Monroe & Hunter.

I have said that the lymphatics absorb solid as well as fluid bodies. This is evident from many facts. The ~~dead~~ destruction or annihilation of the Thymus gland can be accounted for in no other way. The greater levity of the bones of old than of young men; - the absorption of the color imparted to the bones by madder; - the exceptional softness of the bones in certain diseases; - & the detection of ivory matter in the urine, all prove that the lymphatics possess a power over solid matters. - To these we may add the occasional disappearance of schizous

✓ It would seem from this fact, that
the Arteries & lymphatics perform
opposite offices in the system. The
business of the one, is to repair - of the
other, to destroy different parts of the ~~body~~
- of the one, to secrete ~~officer~~ a fluid,
& of the other, to absorb it & mix it again
with the blood from which it was secreted.
Health consists in this strife between the
sanguiferous & lymphatic systems, and
no sooner does an equilibrium take
place between them - than we
suffer as Drapry - Diabetes - Rickets - and
Scurvy - & ^{the} more hereafter.

tumors & wens in every part of the body. They ^{appear to be} removed only in consequence of the action of the lymphatics upon them.

Mr Hunter has remarked that in infancy the cavity of the thigh bone is remarkably small. As the child advances in age, this cavity becomes larger - Thus while the arteries add bony matter to the external, the lymphatics ~~do~~ consume & absorb the internal part of the ~~bone~~ bone. In this manner - it is probable the ~~bones~~ solids are constantly undergoing a renovation in a greater or less degree, more especially in the early part of life. ✓

~~But we have not yet done with the offices of the lymphatics. They~~

I have said ~~the Lymphatics absorb~~
~~Absorption takes place~~
from ~~internal~~ parts of the body, but
it has long been believed that they
absorb likewise from the surface of the
body, and ~~water~~ ~~a large~~ ~~quantity~~ of
many practical inductions in
pathology and the practice of physic
have been made from it. =

